

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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EDITORIAL COMMENT.

Our New Ally.

When the British Government was still shelving Aeronautics as outside the serious consideration of a Ministry juggling with National Insurance, Old Age Pensions, the Disestablishment of the Church, and other similar vote-catching sops to various sections of the electorate, Italy had thoroughly made up her mind that it would be a suicidal policy to pooh-pooh all that was likely to follow the great pioneer work of the Wright Brothers. She has always taken the whole business of Aeronautics seriously from the very first. Without waiting for the perfect aeroplane to be evolved, she determined to take her fair share in helping to develop the science which, to most far-seeing folk, promised to revolutionise many old-world traditions of this globe. Not perhaps unnaturally, having regard to the influence of her then ally, Germany, those in charge of Italy's interests had already regarded lighter-than-air craft as of primary importance, and steps were taken early in the history of dirigibles to keep in front with this type of aircraft. Striking out a line of her own, she did not allow her judgment to be too much influenced by the theories and practice of Zeppelin. The entirely rigid mammoth airship did not commend itself to her, and with the result, she now has a very fine fleet of

airships of a type which is likely to be heard of in the near future. There is an enormous scope for their use in the new field of operations. Germany can certainly not afford to ignore this side of the Italian offensive, and, therefore, the entry of our new ally into the arena in the world's fight for civilisation, from this point of view alone, possesses great significance, and opens out possibilities which may have far-reaching effects—including the re-construction of whatever plan of action against London may have been in contemplation. Whilst Italy is strong in this type of aircraft, she has also at her command a splendid equipment of warplanes which have already entered the active side of operations. In fact, it may be said that the opening of hostilities was between aircraft, as in the attack upon the Adriatic coast on Monday morning by some of the smaller Austrian ships, the way was led by Austrian aeroplanes bombing Venice, both these and the enemy warships being respectively speedily driven off by our ally's aeroplanes and one of her dirigibles and her torpedo-boat destroyers. In a measure this points to what we have always maintained, that in future wars—far distant, we sincerely trust—the first great move will be in the air. The nation which has a sufficiently large air fleet at her command—that is, tens of thousands of warplanes, besides scouting dirigibles—and has that fleet in a highly efficient state of organisation, will be the country which will gain most of the initial advantages of any strategic movements. There will necessarily be a great clash to obtain supremacy at the outset. The one great aim will be early to deprive the enemy army and navy of their "eyes." With this even partially accomplished, subsequent events should resolve themselves into very one-sided contests—a blind man, however skilful, can hardly hope to secure victory against even the most unskilled opponent—and each phase of the present war has demonstrated more and more the advantages obtained from and the absolute necessity of possessing a host of aeroplanes to effectively utilise the hideous and powerful forces away beyond the range of sight. This necessity is in the years to come more likely to be intensified than the reverse, as further "progress" is made in the concoction and improvement of the present ghastly engines of war. Therefore, the Allies, who have so far been fighting so strenuously for the Freedom of the World, have every reason to be pleased at the addition of Italy to their ranks at this stage of the struggle. Judging by reports

already to hand "Gott strafe England" is likely to have a rest for a time, as the Germans will hardly have any energy left to pray thus for this country when they have finished their new appeal to their deity of "Gott strafe Italien."

London and Air Raids.

Although there are possibilities, by the entrance of Italy into the war, of the carefully laid plans for the bombing of London having to be reconsidered, there remains the one fact, that almost at any cost, the Zeppelin clique is pledged to make the attempt within a measurable period of time, whether it prove to be a success, a huge disaster, or a minor success. Whatever the result, it can be left to the Wolff lying press bureau to once more annihilate London in its usual style for the delectation of the German people. Therefore it is not perhaps superfluous that fresh notices have been issued by the Commissioner of the Metropolitan Police advising the public that in the event of any aerial attack, in addition to remaining indoors, so as to avoid both the effect of bombs dropped from the aircraft and of any falling fragments of the shells that may be fired at the marauding visitors, they should also keep all windows and doors on the lower floors closed, so as to prevent the admission of deleterious gases emanating from the poisonous missiles which the gentle cultured folk are likely to leave behind them.

We have already pointed out that in all probability the Zeppelins are likely to make use of poisonous gas bombs, and therefore it would be well for the general public to heed well the warning of the Commissioner, but we get a bit lost when we read in the frillings added to the official notifications such gratuitous advice as, by way of a sample, the following:—

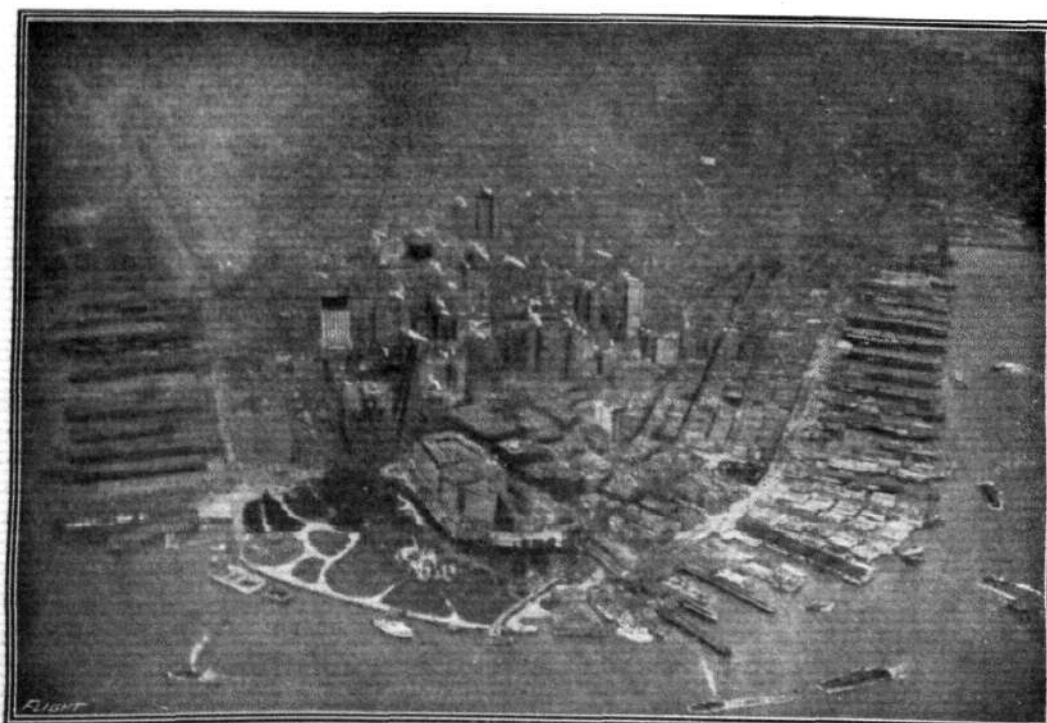
"The advice of the Commissioner of Police may be supplemented. Beyond keeping indoors and closing the windows and doors, a desirable precaution is to paste paper over all the hinges and crevices. That might be done to some extent beforehand, leaving

perhaps one window to be sealed up as soon as the alarm is given. The inmates should remain in the room till assured that all danger is past, the streets being in the meantime cleared of gas by special measures taken by the police and the fire brigade. An additional precaution—though not for outdoor use—would be a woollen cloth saturated with water and held over the mouth and nostrils."

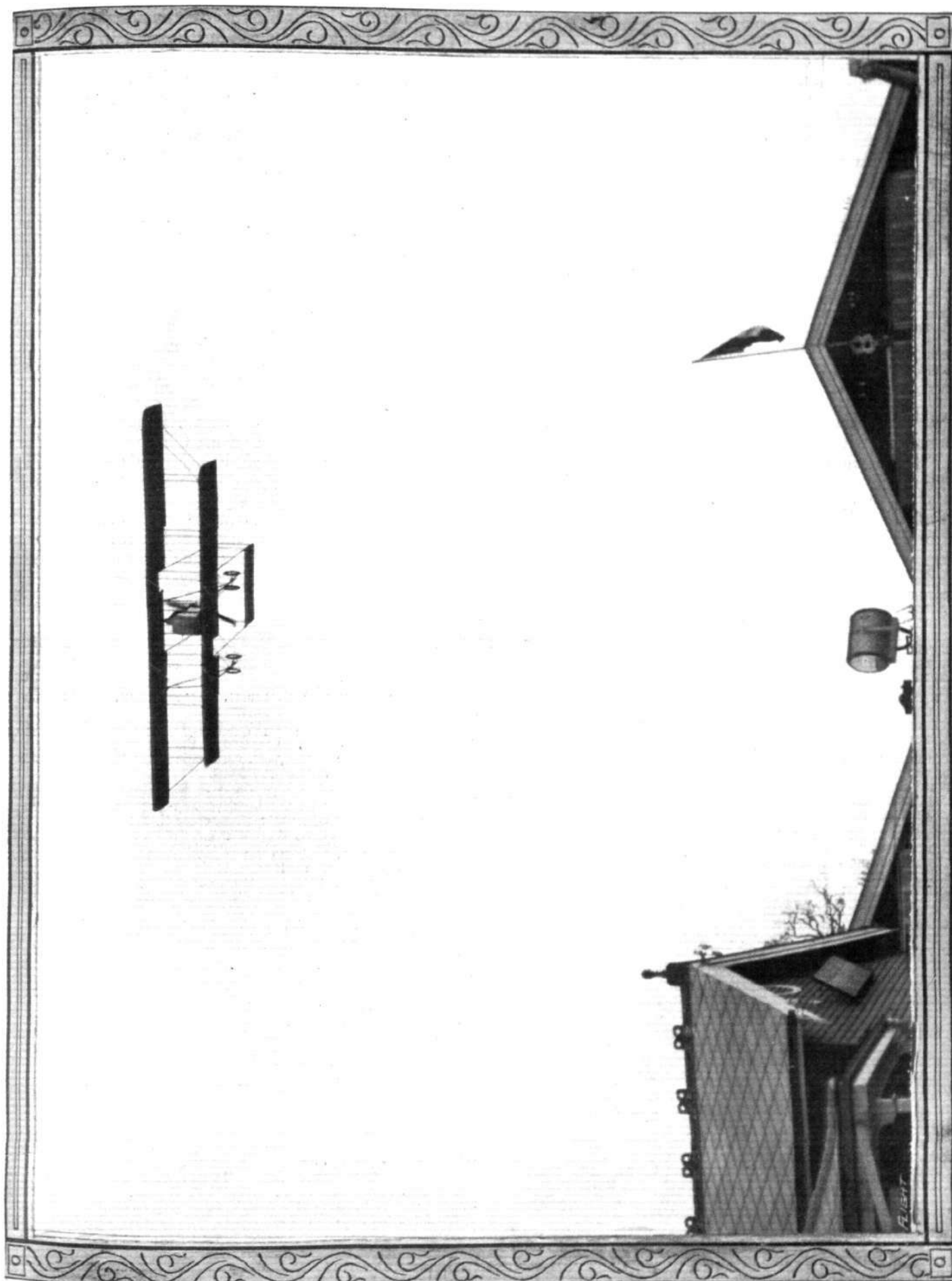
We have not been favoured with details of the air-raiders' programme and dates, but if we were sure they would be worrying around for a week or more before turning back for home, there are quite a lot of other methods of avoiding any evil consequences from their attentions which we could suggest.

Anyway, there is one we would mention which may be worth noting and preparing in advance. A solution of hyposulphite of soda, commonly called "hypo," is a good antidote to the poisonous chlorine fumes which the German bombs are credited with emitting. There would be no harm in having a solution of this, about six ozs. to the pint of water—it is quite a cheap chemical—in some convenient place, and as many pieces of woollen cloth side by side as will suffice for each individual household. Upon the first alarm, saturate the cloth with the mixture and tie over nose and mouth. At least the worst effects of the blonde beast's concoctions would thereby be nullified. The mixture is improved by adding a little washing soda, and there is no reason why the respirators should not be made in advance by soaking clean cotton waste in the solution, drying off in the air, and using it in a net veil. This mixture is good for 99 per cent. of the abominations likely to be used. Special constables, who will no doubt be called upon to act at the time, might do worse than also make a note of this. The City Police have already taken precautions in this direction, and it has been suggested that the men of the Fire Brigade should be similarly equipped.

In the event of a bomb hitting you—well, perhaps it would be as well to 'phone to, or, better still, take a taxi to one of the newspaper offices from which the advice we have quoted emanates, and ask what to do.



FROM ABOVE.—A corner of New York City, as seen from a height of 2,000 ft.



Mr. F. W. Merriam with a pupil on a Maurice Farman, coming in over the sheds at Hendon.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

In the despatch dated May 21st from Sir John French there was the following:—

"Last night we brought down a German aeroplane in the neighbourhood of Ypres."

In an official statement issued in Cairo on the 19th, there was the following:—

"The same day (May 16th), our howitzer batteries, with the aid of aeroplanes, blew up the ammunition wagons of the Turkish heavy howitzers, and later made a direct hit on one of the guns, in front of the Australian and New Zealand Corps.

"The enemy's trenches and the new gun emplacements were demolished by howitzer fire."

In a statement issued in Cairo on Saturday there was the following:—

"On May 19th . . . our aeroplanes dropped bombs amongst Turkish reinforcements landing in Ak Bashi Liman, and caused considerable losses."

In the *communiqué* issued in Paris on the evening of the 20th, there was the following:—

"The day has been marked by a sharp artillery duel, in the course of which two German aviators were brought down, one by the British artillery and the other by ours."

In the evening *communiqué* issued in Paris on Sunday there was the following:—

"An enemy aeroplane threw three bombs on the open town of Chateau Thierry."

In a special statement issued in Petrograd on the 18th inst. there was the following:—

"At this point (near Jaroslav), in the course of the day, we brought down several enemy aeroplanes which were correcting the fire of the numerous enemy batteries."

In a *communiqué* issued on the 20th it was stated:—

"Detachments of enemy aeroplanes threw bombs on Przemyśl, against which the enemy attempted no other action."

In an official *communiqué* issued in Rome on Monday:—

"Aeroplanes even attempted an attack upon the arsenal at Venice. . . .

"The enemy's aeroplanes were bombarded by our anti-aircraft guns, and were also attacked by an Italian aeroplane and a dirigible flying over the Adriatic.

"The places attacked are . . . Ancona, where the attack was particularly directed to interrupt the railway line, and caused slight damage, easy to repair. . . . and at Jesi, where the enemy's aeroplanes launched bombs on a hangar, though without hitting their object."

In a subsequent *communiqué* it was stated:—

"Further information as to the aerial raid on Venice shows that there were two aeroplanes which threw eleven bombs without doing serious damage. The defence was prompt and efficacious and immediately put the hostile aviators to flight. The slight damage done to the railway by hostile aeroplanes and ships early this morning has already been repaired."

THE BRITISH AIR SERVICES.

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

Royal Naval Air Service.

THE following appeared in the Admiralty announcements of the 19th inst.:—

Temporary Sub-Lieuts. D. W. Blair and H. B. Spanton, both to "Ark Royal." To date May 18th.

The following appeared in the Admiralty announcements of the 20th inst.:—

Flight-Lieut. C. F. Lan-Davis, to "Ark Royal." May 19th.

The following appeared in the Admiralty announcements of the 21st inst.:—

The following entries have been made: H. K. Thorold, A. F. Warner, and E. W. Norton, all as Probationary Flight Sub-Lieutenants; S. D. Felkin, H. S. Neville, E. L. Trower, A. H. Sandwell, and W. A. K. Dalzell, as Probationary Flight Sub-Lieutenants, for temporary service, all with seniority of May 25th, and appointed to "President," additional, for R.N.A.S.

The following appeared in the Admiralty announcements of the 22nd inst.:—

The following have been entered as Probationary Flight Sub-Lieutenants for temporary service, to date as stated:—Walter B. Lawson and Cecil R. Terranean; to date May 31st. David Gill; to date May 23rd. Herbert Hall and A. D. Thompson; to date May 14th.

The following was included in the Admiralty announcements of the 25th inst.:—

Probationary Flight Sub-Lieutenants B. Travers, H. H. Square, L. P. Openshaw, W. H. Dunn, R. G. Mack, and F. G. T. Hards (temporary), all confirmed with original seniority and reappointed. To date May 24th.

Temporary Sub-Lieut. (R.N.V.R.) T. E. Viney, transferred to R.N.A.S., as Probationary Flight Sub-Lieutenant, with seniority of May 20th, and appointed to "President," additional, for R.N.A.S.

Petty Officers W. G. Oakman and D. P. Starr, both granted temporary commissions as Sub-Lieutenants (R.N.V.R.), with

seniority of May 15th, and appointed to "President," additional, for duty with R.N.A.S.

Staff Engineer (retired) M. Stuart, to "President," additional, for duty with R.N.A.S. May 22nd.

J. E. D. Boyd, W. H. Sharpe, and B. Gregg (Second Lieut., 3rd Batt. Yorkshire Regt.), all entered as Probationary Flight Sub-Lieutenants, for temporary service, with seniority of May 22nd, and appointed to "President," for R.N.A.S.

Chief Petty Officers A. Lanman and F. E. Bishop, promoted to Warrant Officers (Second Grade), with seniority of April 17th, and both appointed to "President," additional for R.N.A.S.

R. M. D. Anderson entered as Warrant Officer (Second Grade), for temporary service, with seniority of May 22nd, and appointed to "President," additional, for R.N.A.S.

Royal Flying Corps (Military Wing).

THE following appeared in a supplement to the *London Gazette* issued on the 19th inst.:—

Supplementary to Regular Corps.—To be Second Lieutenants (on probation): Frederick W. Stent, Valentine M. Grantham; May 1st, 1915. John B. Robinson, John A. W. Bourne; May 6th, 1915. Valentine W. Eyre; May 7th, 1915.

The following appeared in a supplement to the *London Gazette* issued on the 20th inst.:—

Flying Officer.—Temporary Second Lieut. E. A. H. Viscount Exmouth, 7th (Service) Batt., Princess Charlotte of Wales's (Royal Berkshire Regt.), and to be transferred to the General List, New Armies. May 4th, 1915.

The following appeared in the *London Gazette* of the 21st inst.:—

Flying Officers.—Sec. Lieut. Cecil H. Pixton, Special Reserve; April 2nd, 1915. May 6th, 1915: Capt. John G. Hearson, R.E.; Lieut. F. E. Hellyer, 9th (Cyclist) Batt., Hampshire Regt., T.F.

The following appeared in a supplement to the *London Gazette* issued on the 22nd inst.:—

Supplementary to Regular Corps.—To be Second Lieutenants (on probation): April 30th, 1915: James P. C. Cooper, Alan C. Horsburgh. May 17th, 1915: Hamilton K. Maxwell, George P. Grenfell.

The following appeared in the *London Gazette* of the 25th inst.:—

Assistant Equipment Officer.—Lieut. Arthur V. Newton, 3rd Batt. Prince Albert's (Somerset L.I.), and to be seconded. May 10th.

Squadron Commander (temporary).—Capt. Seaton D. Massy, 29th Punjab, Indian Army, from a Flight Commander, and to be temp. Major. May 13th, 1915.

THE DAUGHERTY TRACTOR BIPLANE.

EARL S. DAUGHERTY, the well-known American pilot, who claims to have flown more types of machines than any other American pilot, is responsible for the design of the very "business-like-looking" machine shown in the accompanying illustrations and scale drawings. It was built for him at Chicago last winter by Max Stupar, and

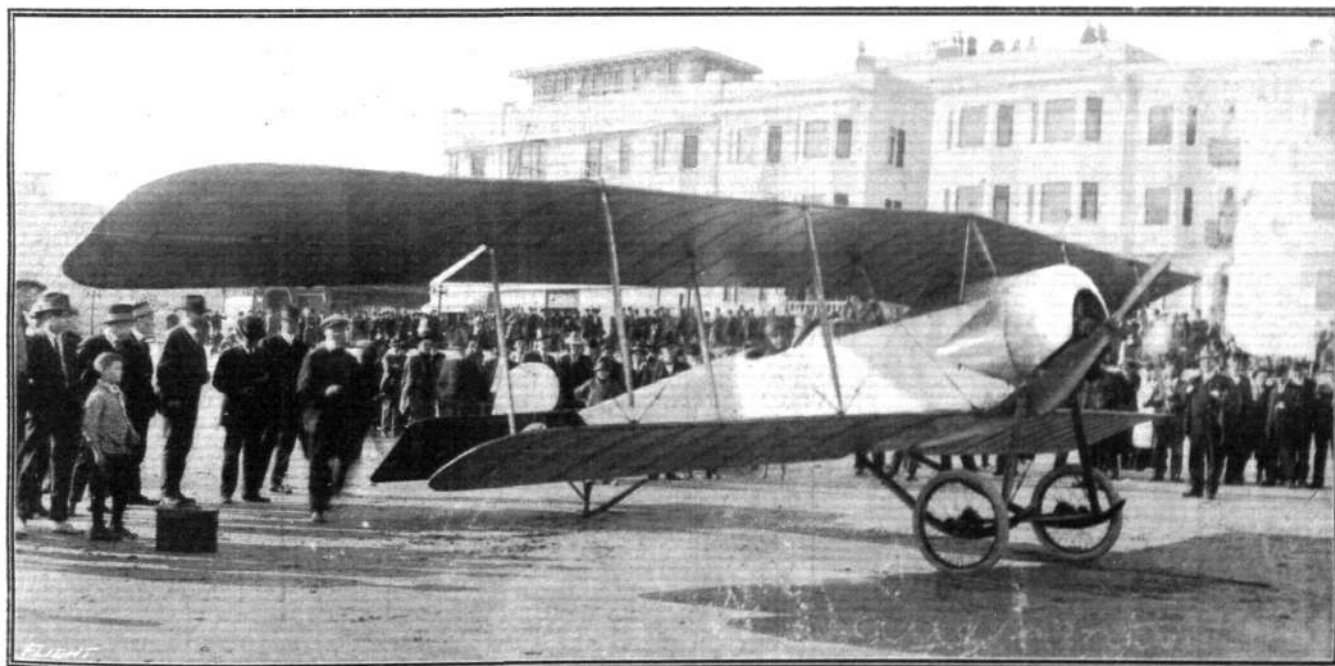


Earl S. Daugherty in the pilot's seat of his tractor biplane.

on it he has been making numerous successful flights at Long Beach.

It is a tractor biplane with swept-back wings, following the practice of certain German types, but otherwise it is more or less original in design. Special attention has been given to the quick assembling and dismantling of

tions abut against the bottom longitudinals of the body, quick detachable fittings being employed. Four pairs of streamline spruce struts separate the top and bottom planes, which are 4 ft. 6 ins. apart, and cable is employed for bracing the same. The top attachment of the interplane struts, is by means of eye-bolts fixed to the spars, and the attachment to the lower plane is by quick detachable fittings which permit the withdrawal of the struts without interfering with the adjustment of the bracing. If required the top plane extensions can be replaced by small sections so as to give a total span of 26 ft., for speed work. The planes are built up on two spars, the front ones of D section, forming the leading edge and the rear ones of rectangular section, spaced 3 ft. 6 ins. from the former; both front and rear spars measure $1\frac{1}{4}$ ins. by $1\frac{3}{4}$ ins. The ribs are built up of spruce battens and webs, glued and nailed together, and fastened front and back to the spars by metal strips. They are spaced at intervals of about 1 ft., and have a maximum thickness of $1\frac{1}{4}$ ins. The wing section has a maximum camber of $3\frac{1}{4}$ ins. for the top plane, that of the lower plane being in proportion, situated at a point 30 per cent. of the chord from the leading edge. The whole wing framework is strongly braced with steel wire, and covered with linen treated with Emaillite. Hinged to the rear spars of the top plane extensions are the balancing flaps, which are interconnected. The tail planes consist of a fixed surface, 10 sq. ft. area, of very high aspect ratio, hinged to which are two elevator flaps of about 10 sq. ft. each, with a partly balanced vertical

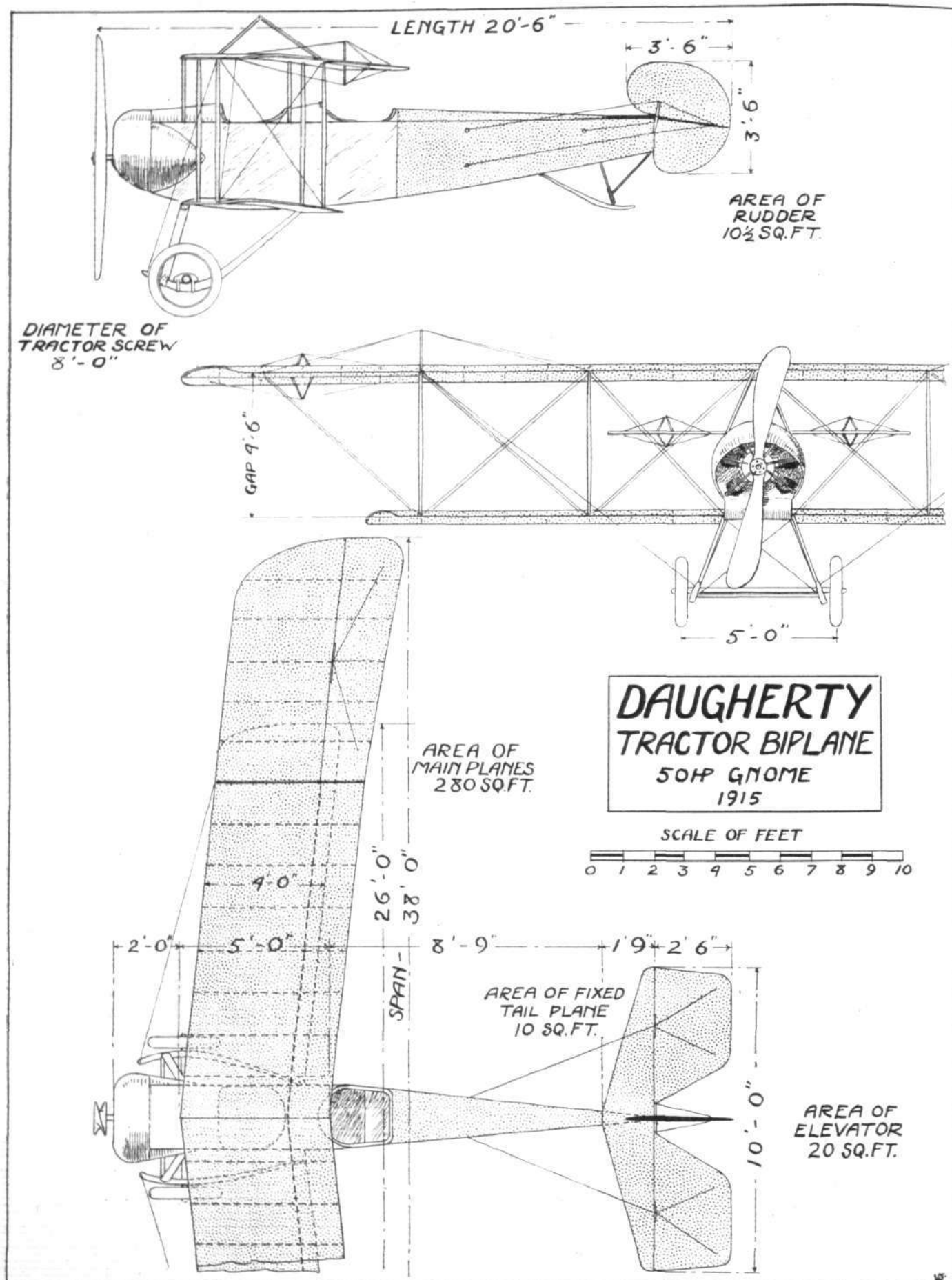


Three-quarter front view of the Daugherty tractor biplane.

the various parts, so that it should be specially suitable for military or exhibition purposes. Top and bottom planes have a span of 38 ft. and 26 ft. respectively, whilst the respective chords are 5 ft. and 4 ft. The top plane is divided into four sections, consisting of two inner sections, 11 ft. span each, divided in the centre, and two outer extensions 8 ft. each. The inner ends of the centre sections are attached to two pairs of inverted V struts mounted above the body, and the two lower plane sec-

rudder mounted between them. The tail is protected by a rubber sprung skid.

The body is of rectangular section, divided into two portions to facilitate shipment. The longitudinals and struts of the front section are of ash, and those of the rear half are of spruce. The engine, a 50 h.p. Gnome, is mounted in the nose of the body, and partially enclosed by a metal cowl. Immediately behind the engine is the passenger's cockpit, and behind that again, at the rear

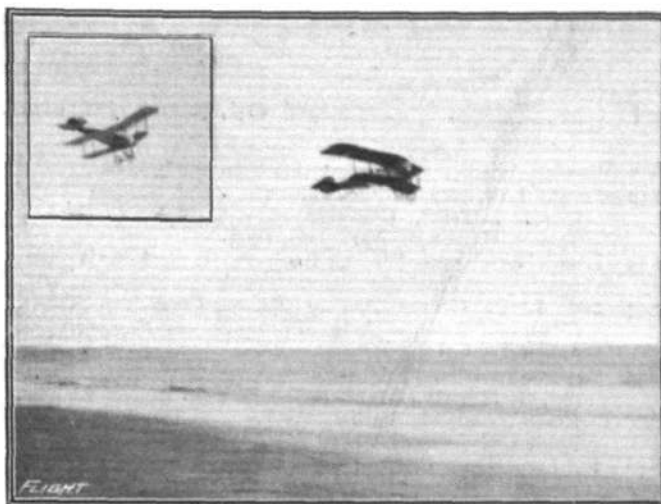


Plan, front and side elevation to scale of the Daugherty tractor biplane.

of the trailing edge of the top plane, is the pilot's. The body is fabric-covered, at the rear half, whilst the fore-portion is covered with metal sheeting. The control is of the Farman type, consisting of a universally jointed lever for the balancing flaps and elevators, and a horizontal foot-bar for the rudder. For school work a dual control is provided, which can be disconnected by the pilot at will. The under-carriage consists of two curved laminated skids which are connected to the body at their rear ends, and two short struts, 22 ins. in length, forming a connection with the body at the forward ends. A pair of 28 in. wheels are mounted on a $1\frac{1}{2}$ in. tubular steel axle, which is attached to the skids by rubber shock-absorbers. The whole of the landing gear can be detached from the body by the removal of four $\frac{1}{2}$ pins. The fuel tanks have a capacity of 15 gallons of petrol and 8 gallons of oil, and provision is made for an extra petrol tank in the passenger compartment.

On the dash in front of the pilot is a full range of instruments, such as barograph, gradometer, revolution indicator, and also switches for an electric searchlight to be used for night work. The weight of this machine comes out at about 540 lbs. empty. We understand that Mr. Daugherty has just recently had a demonstration of the strength of his machine through an accident at Long

Beach. Owing to a mishap to the control gear whilst making a banked turn, the machine fell to the ground,



The Daugherty tractor biplane in flight at Long Beach.

landing full on the motor. In spite of this, the machine was not beyond repair, and will be flying again shortly.

FLYING AT HENDON.

THE Kaiser and the weather have a lot to answer for. As regards the latter, it has been particularly unkind to Hendon in spoiling the special flying meetings this year, for on these occasions there has been either a very high wind or a steady downpour of rain. It was in the former mood this Whitsun, and it was only on Saturday that any display took place, whilst, to make matters more irritating, the atmospheric conditions were otherwise extremely pleasant. The tram strike also prevented a host of people from reaching the aerodrome, but as there was nothing doing on the Saturday and Sunday, this was, perhaps, a blessing—for them—in disguise.

It was shortly after three o'clock on Saturday afternoon that M. Osipenko ascended on the 50 h.p. G.-W. biplane, and made the first flight. Marcus D. Manton, feeling much better after his recent indisposition, took up the same machine immediately after, and put up several circuits, including some banked turns. E. Baumann then got going on the 60 h.p. (Gnome) Ruffy-Baumann Caudron, whilst J. S. B. Winter ascended to about

1,000 ft. or more on the 50 h.p. G.-W. 'bus, finishing up with a spiral *vol plané* and a magnificent landing. W. Roche-Kelly next gave an exhibition of steep banking on the 50 h.p. Beatty biplane, after which Osipenko went up again on the 50 h.p. G.-W. 'bus. G. Virgilio, one of our latest allies, then took over the 60 h.p. R.B. Caudron, and Kelly made another flight on the Beatty biplane. After this Baumann carried a passenger on the 60 h.p. Ruffy-Baumann biplane, ascending to a height of about 3,000 feet in a very short space of time. By this time the wind had increased in violence, and a short flight by Kelly on the Beatty biplane, and one by a naval officer on the 100 h.p. Sopwith gun-'bus, brought the proceedings to a close.

On Whit Monday afternoon a large crowd, considering the difficulty of getting to the aerodrome, put in an appearance, and both M. Osipenko and W. Roche-Kelly made several plucky attempts to put up exhibition flights for their benefit, but found the wind a great deal too much for them.

The Roll of Honour.

THE Secretary of the Admiralty has announced the following casualty:—

Under date May 22nd:

Killed.
Lieutenant the Hon. Arthur G. Coke, R.N.V.R., Armoured Cars Division.

The following casualties in the Expeditionary Force have been officially reported by the War Office:—

Under date May 17th:

Killed.
Lieutenant M. L. Braithwaite, Royal Field Artillery, attached R.F.C.

Under date May 20th:

Killed.
Major B. H. Barrington-Kennett, Grenadier Guards, 2nd Bn.

Wounded.
Captain A. D. Gaye, Bedfordshire Regiment, attached R.F.C.
Lieutenant G. Graham, R.F.C.

It is unofficially announced that Lieutenant J. A. Johnstone, Royal Field Artillery, attached R.F.C., was killed in action in France on May 20th.

V.C. for the late Lieut. Rhodes-Moorhouse.

FOLLOWING on the official announcement of the posthumous promotion of Second-Lieut. W. B. Rhodes-Moorhouse, for his bomb attack on Courtrai railway junction, in which he was mortally wounded, it was notified in a supplement to the *London Gazette*, issued on Saturday, that the courageous act had been rewarded by the Victoria Cross. The official notice was as follows:—

His Majesty the King has been graciously pleased to approve of the grant of the Victoria Cross to the under-mentioned officers, non-commissioned officer, and men, for their conspicuous acts of bravery and devotion to duty whilst serving with the Expeditionary Force:

Second Lieutenant William Barnard Rhodes-Moorhouse,
Special Reserve, Royal Flying Corps.

For most conspicuous bravery on April 26th, 1915, in flying to Courtrai and dropping bombs on the railway line near that station. On starting the return journey he was mortally wounded, but succeeded in flying for 35 miles to his destination, at a very low altitude, and reported the successful accomplishment of his object. He has since died of wounds.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Aviators' Certificates.

THE following Aviators' Certificates have been granted :—

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| <p>1242 Lieut. Lawrence Arthur Pattinson (5th Durham Light Infantry, T.F.), (Maurice Farman Biplane, Military School, Harrow). April 30th, 1915.</p> <p>1243 Lucien Deschamps (French Subject), (L. and P. Biplane, London and Provincial School, Hendon). May 11th, 1915.</p> <p>1244 2nd Lieut. George Antony Turton (Yorkshire Regt.), (Maurice Farman Biplane, Military School, Farnborough). May 12th, 1915.</p> <p>1245 (Hydro-Aeroplane) Flight Commander Hyde Hyde-Thomson, R.N.A.S. (Wight Seaplane and Bristol Biplane, Royal Naval Air Station, Calshot, and Royal Naval Air Station, Chingford). May 15th, 1915.</p> <p>1246 2nd Lieut. Colin Cooper (Royal West Surrey Regt.) (Maurice Farman Biplane, Military School, Farnborough). May 17th, 1915.</p> <p>1247 Sergeant Alfred Ernest Sharpe, R.F.C. (Maurice Farman Biplane, Central Flying School, Upavon). May 19th, 1915.</p> <p>1248 Lieut. Bache McEvers Athole Hay (19th Hussars), (Beatty-Wright Biplane, Beatty School, Hendon). May 20th, 1915.</p> <p>1249 Flight Sub-Lieut. Theophilus Chater Vernon, R.N.A.S. (Maurice Farman Biplane, Central Flying School, Upavon). April 15th, 1915.</p> <p>1250 Capt. Bindon Blood (4th Hussars) (Maurice Farman Biplane, British Flying School, Le Crotoy, France). April 18th, 1915.</p> <p>1251 Lieut. R. T. Vachell (Northumberland Fusiliers) (Maurice Farman Biplane, British Flying School, Le Crotoy, France). April 28th, 1915.</p> <p>1252 2nd Lieut. O. V. Le Bas (1st Queen's, Royal West Surrey Regt.) (Maurice Farman Biplane, British Flying School, Le Crotoy, France). April 29th, 1915.</p> <p>1253 Capt. R. G. Cherry, R.F.A. (Maurice Farman Biplane, British Flying School, Le Crotoy, France). April 30th, 1915.</p> <p>1254 Capt. H. S. L. Scott (4th Hussars) (Maurice Farman Biplane, British Flying School, Le Crotoy, France). April 30th, 1915.</p> <p>1255 2nd Lieut. D. K. Johnstone, R.F.C. (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 6th, 1915.</p> <p>1256 2nd Lieut. C. R. Rowden (Worcestershire Regt.) (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 7th, 1915.</p> <p>1257 Lieut. K. B. Harbord, R.F.A. (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 11th, 1915.</p> | <p>1258 2nd Lieut. R. Balcombe-Brown, R.F.A. (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 12th, 1915.</p> <p>1259 1st Air Mechanic A. Reffell, R.F.C. (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 17th, 1915.</p> <p>1260 Flight Sub-Lieut. William Laurent Greer, R.N.A.S. (Grahame-White Biplane, Grahame-White School, Hendon). May 20th, 1915.</p> <p>1261 2nd Lieut. Guy Stedman May Ashby, R.G.A. (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 20th, 1915.</p> <p>1262 Percy George Allen (L. and P. Biplane, London and Provincial School, Hendon). May 21st, 1915.</p> <p>1263 Arthur Thomas Whitelock (Maurice Farman Biplane, Military School, Brooklands). May 22nd, 1915.</p> <p>1264 Capt. Adrian Helyar Knopp O'Brien (2nd Dragoon Guards, Queen's Bays), (Maurice Farman Biplane, British Flying School, Le Crotoy, France). May 22nd, 1915.</p> <p>1265 George Edward Heygate Fincham (Maurice Farman Biplane, Military School, Brooklands). May 24th, 1915.</p> <p>1266 Herbert Sanford Ward (Maurice Farman Biplane, Military School, Brooklands). May 25th, 1915.</p> |
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THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 166, Piccadilly, London, W.

| Subscriptions. | £ | s. | d. |
|--|-------|----|----|
| Total subscriptions received to May 19th, 1915... | 9,000 | 0 | 0 |
| The Aster Engineering Co. (1913), Ltd. ... | 5 | 5 | 0 |
| Total, May 26th, 1915 ... | 9,005 | 5 | 0 |
| 166, Piccadilly, W. B. STEVENSON, Assistant Secretary. | | | |

FROM THE BRITISH FLYING GROUNDS.

London Aerodrome, Collindale Avenue, Hendon.

Grahame - White School.—Sunday, last week, straights with instructor: Probationary Flight Sub-Lieuts. De Roeper, De Ville, Leigh, Simpson and Smylie. Half circuits, Probationary Flight Sub-Lieut. Wain. Circuits: Probationary Flight Sub-Lieut. Greer.

Wednesday, straights with instructor: Probationary Flight Sub-Lieuts. De Roeper, Leigh, Simpson and Smylie. Straights alone: Probationary Flight Sub-Lieuts. De Ville, Simpson and Smylie. Circuits: Probationary Flight Sub-Lieuts. Greer and Wain. *Brevet* test A: Probationary Flight Sub-Lieut. Greer.

Thursday, straights with instructor: Probationary Flight Sub-Lieuts. Leigh and Bennington. Straights alone: Probationary Flight Sub-Lieuts. De Roeper and Smylie. Circuits: Probationary Flight Sub-Lieuts. De Ville and Wain. *Brevet* test B and C: Probationary Flight Sub-Lieut. Greer.

Friday, straights with instructor: Probationary Flight Sub-Lieut. Leigh. Straights alone: Probationary Flight Sub-Lieut. De Roeper. Circuits and eights: Probationary Flight Sub-Lieuts. De Ville, Smylie and Wain.

Beatty School.—The following pupils were out during the week accompanied by the instructors: Messrs. Bond (19 mins.), Chalmers (51), Chapelle (25), Crossman (10), de Meza (10), Fitzherbert (10), Hay (65), Johnston (43), Morgan (20), Ross (25), Rutherford (8), Tomlinson (44), Robb (12), Broughton (24), King (14), Jones (50), Davison (18), Eaton (18), Fox (10), and Ardon (13). The instructors were: Messrs. G. W. Beatty, W. Roche-Kelly, C. B. Prodger, and Bransby Williams, the machines in use being Beatty-Wright dual control and single-seater and Caudron tractors. Exhibition flying on Whit Monday. Mr. Hay took his certificate on Thursday after only 2½ hours' flying.

Hall School.—Last week, owing to the bad weather experienced during the first part of the week, no school work was possible.

During Thursday morning the following pupils received instruction: Messrs. Snowdon (8 mins.), Snook (7), Millbourne (9), Hamer (12), Booker (12), Bayley (10), Thursday evening, pupils receiving rolling practice: Messrs. Snook (7 mins.), Hamer (9), Mason (7), Scott (11), Booker (12), Hatchman (12), and Snowdon (10).



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Mr. W. D. Smiles, who has just taken his brevet at the London and Provincial Flying School, Hendon.

Friday, Messrs. Snook (6 mins.), Snowdon (6), Millbourne (12), Hatchman (11), Russell (16), Snook (4), Bayley (12), Mitchell (12), and Booker (10).

Instructor for the week: Mr. H. F. Stevens. Machines in use: Hall tractor biplanes.

London and Provincial Aviation Co.—Last week, though the weather on the whole was bad, a lot of useful work was done. Machines in use: 3 L and P biplanes.

Wednesday, Mr. Wattinue rolling. Messrs. Irwing and Redgrave Gunner rolling. Mr. Bell rolling, improving rapidly, finished by flying straights. Mr. Abbott passenger flight with Mr. Moore.

Thursday, Messrs. Redgrave Gunner, Irwing and Wattinue rolling. Messrs. Bell, Turner and Tranchoume straights.

Friday, Mr. Allen circuits and eights, then took his certificate. He showed excellent judgment on his landing on the mark, and his *vol plané* was perfect. His course of instruction lasted twenty-one days, and for the last week he had been unable to practise. Messrs. Turner and Bell straights. Mr. Irwing rolling, showing vast improvement, finished by doing several good straights. Mr. Bell passenger flight with Mr. Smiles.

Instructors for the week: Messrs. M. G. Smiles, W. T. Warren, J. H. Moore, and W. D. Smiles.

Ruffy-Baumann School.—Although the weather last week has not been ideal, much sound practi-

cal work has been done at this school, constructionally and with actual flying.

On Wednesday the 60 h.p. Caudron type (Ruffy-Baumann), under pilotage of M. Baumann, put up some fine work, taking Mr. Robertson for long flights. This new pupil is getting on exceptionally well, and has the makings of a good steady pilot. Hubbard and Fleming doing extra practice on 50 Caudron type, and two passengers taken by Baumann. 45 Caudron type under pilotage of Messrs. Blandy, Cole, and Lieut. Broughton.

Thursday, England, Hudson, Sykes and Hubbard all out on 45 and 50 Caudron type.

Friday, Cole doing very well on 45 and 50. King made extra good flight in bumpy wind on the 50, and now takes ticket first opportunity.

On Saturday the wind rose high, but Baumann, nevertheless, made passenger flights on the 60, while Virgilio performed his usual artistic "stunts" to the delight of onlookers. His style of flying is quite neat, and his stunts attractive.

Instructors: Baumann, James Bros., Virgilio, and Winchester.

Northern Aircraft Co., Ltd.

The Seaplane School, Windermere.—Pupils receiving instruction during last week were: Flight Lieut. L. L. Atherton, Probationary Flight Sub-Lieuts. R. M. Clifford (15 mins.), L. W. Hodges (14), F. R. Laver (18), Messrs. C. A. Barber (31), W. Laidler (19), N. K. Lawton (16), D. S. C. Macaskie (17), F. H. M. Macintyre (20), H. Robinson (16). Straights or rolling alone: H. Slingsby (8), H. P. Reid (17), Flight Lieut. Atherton (9). Circuits alone: R. Buck (70). Machines in use:—Tractor biplane: Avro dual control, 50 Gnome. Monoplanes: N.A.C. propeller, 80 Gnome; N.A.C.-Blériot, 35 Humber. Messrs. W. Rowland Ding and J. Lankester Parker out testing on several occasions.

Instructors: W. Rowland Ding and J. Lankester Parker.



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Flight Sub-Lieut. G. H. Beard, R.N.A.S.



Mr. G. Virgilio.

Two pilots who have recently taken their tickets at the Beatty School, Hendon.

EDDIES.

FROM Flight Sergeant A. E. Barrs, back in harness at the front, having quite recovered from the accident in which he injured one of his legs, comes a very cheery letter, from which I gather that he is now in the same Flight as 2nd Lieut. Carr, and is flying a Morane parasol. He gives me details of another fall he has just had, although the consequences were not so serious as in the previous one. He was crossing a wide ditch on a narrow—very narrow—plank, and when just in the middle he side-slipped and did a tail slide into the ditch, which was four feet deep in mud and water, in the proportion of 10 to 1, with mud in the majority. However, little incidents like that are all in the day's work, and Barrs is as cheerful as ever, with many a thought of his numerous friends over here.

× × ×

Among our French brothers-in-arms who are distinguishing themselves in the various branches of air work, one continually finds the names of several who are well beloved on this side, and who are known to all our readers from their achievements in time of peace. Enseigne Jean Conneau, better known by his *nom de vol* as "Andre Beaumont," who, it will be remembered, won the first Circuit of Britain, has been promoted to Lieut. de Vaisseau, in recognition of a great many highly dangerous bomb-dropping expeditions which he has carried out. According to the official details, from one of these he returned with one of his elevator cables broken by a bullet. In addition to his promotion, Conneau has been recommended for the Medaille Militaire.

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Louis Paulhan, who won the first London-Manchester race, has also rendered very valuable services, for which he has been promoted to Capitaine. Henri Salmét, whose exhibitions in numerous parts of England did so much towards popularising aviation, has been mentioned in Army Orders. During one of his flights Salmét approached to within 80 ft. of a German machine, in order to give his observer a good chance to disable the hostile aircraft by gunfire. Pegoud, the originator of looping the loop, has not been idle either. Several times he has chased German machines back behind their own lines, and on one occasion he brought down a German monoplane. No sooner had he done so than

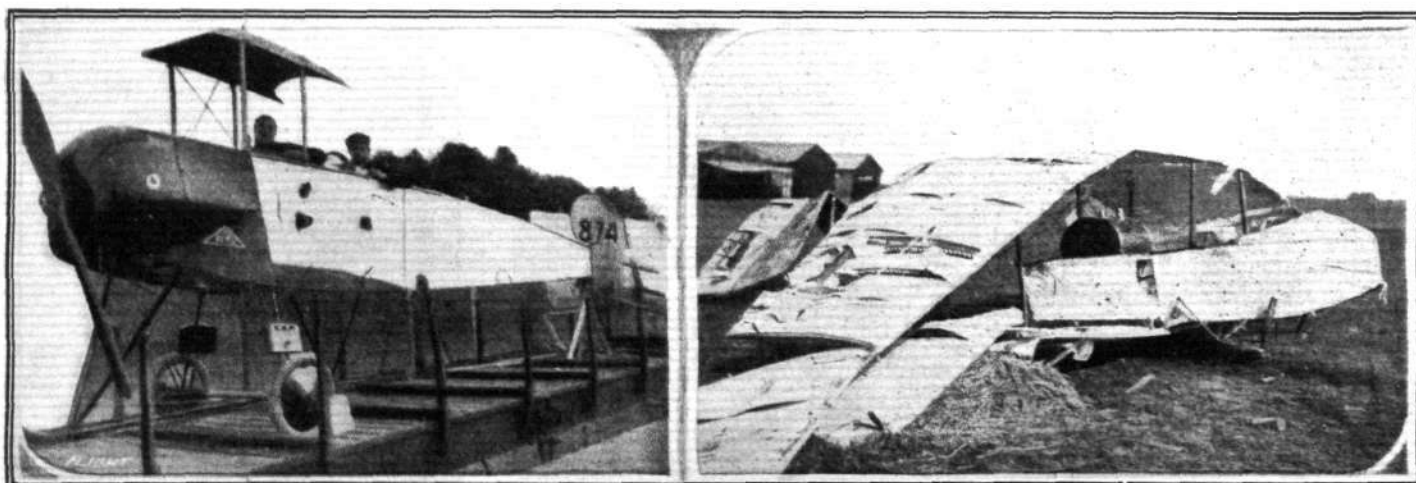
he in his turn was attacked by two biplanes. One of these he brought crashing to earth, while the other was forced to descend. For this and other exploits Pegoud has also been awarded the Medaille Militaire. Eugene Gilbert, whose brilliant achievements were referred to recently, has been nominated Chevalier of the Legion of Honour.

× × ×

Generally speaking German aeroplane constructors may be said to have concentrated their energy on the standardisation of certain types of machines that had already proved their merit, rather than to launch out into costly and venturesome experiments with new and untried models. The same more or less applies to the comparatively few Austro-Hungarian constructors, several of whom have been content to build aircraft of German design under licence. That there are designers, however, who are working along different lines seems evident from an account in a German aeronautical journal of an engineer in Prague—Herr Stiassny—who has constructed a huge machine, probably influenced by the successes of the large Sikorsky biplanes, which is said to be—or, more correctly speaking, to have been—able to carry a number of passengers as well as a goodly load of explosives. Some time ago Herr Stiassny took the machine—that is to say, part of it—for its first and last flight. While taxiing over the ground the wheels under the front part collapsed, and at the same time the rear portion developed an unexpected and exceedingly high value of $K\alpha$. The result was a somersault, from which only the pilot escaped intact, the machine being thoroughly smashed. It is rumoured that, as he was worming his way out of the maze of splintered struts and coils of cable, the unlucky pilot muttered "Gott strafe Sikorsky."

× × ×

It seems that it is not only with machines of the land-going type that the Huns are experimenting, for another account which has filtered through from Mannheim says that an experimenter there, Otto M. Leidel, has invented a new seaplane. But few particulars of this new and alleged wonderful machine are vouchsafed, except that it is to be a triplane and to possess the advantage that even should both the engine and the control surfaces fail, it



TWO WOUNDED FLYERS.—On the left Squadron-Commander Briggs' Avro biplane, captured by the Germans at Friedrichshafen. Note the bullet holes in the fuselage. On the right a Henry Farman biplane brought down by shell fire.

will descend in a slow flat glide to the surface of the sea. It is just possible, however, that the glide will not be quite as slow and flat as anticipated, if it ever comes within range of one of our men-of-war's anti-aircraft guns.

x x x

An American pilot who has done a lot of passenger-carrying, and who seems to be in addition a good deal of a psychologist, ventures the following dictum, which appears to me to have more than a grain of truth in it: "Many a man takes a flight for the same reason that the same type of man takes a cold bath—to brag about it for the rest of his life."

x x x

Ever since the earlier part of the war there have been in circulation numerous more or less fantastic rumours differing considerably in detail, but all being to the effect that Hellmuth Hirth, the well-known German aviator, had been found guilty of espionage, and shot. It is always difficult to trace the origin of such stories, but a letter from Hirth, written last November, apparently to lay the rumours, has been published in *Flugsport*. In this he relates his movements during the weeks immediately preceding the outbreak of hostilities, but it would seem to indicate but a poor foundation on which the rumours have possibly been built.

x x x

Hirth, it will be recalled, took part in the London-Paris-London race on a Morane-Saulnier monoplane, a choice of machine for which, by the way, he was severely criticised in the German aeronautical press, on the contention that a pilot of his standing could have had the pick of German machines if he would have made known his desire to take part in the contest. In his letter Hirth recounts how he and Garros, after the race, stayed in this country for a week, during which time visits were paid to various English aircraft works. One cloudy afternoon he and Garros started for Paris, each on a Morane-Saulnier monoplane. They kept together as far as the Channel, where Hirth lost some little time in climbing to what he considered a safe altitude. His engine, which had, it may be remembered, been constantly giving trouble during the race, was by now running perfectly, but he had only covered about a mile of the cross-Channel trip when one of the cylinders began to miss, owing to a sooted plug. As the machine flew quite well with only eight cylinders firing, Hirth decided against turning back, but he had by then run

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The Work of the R.F.C.

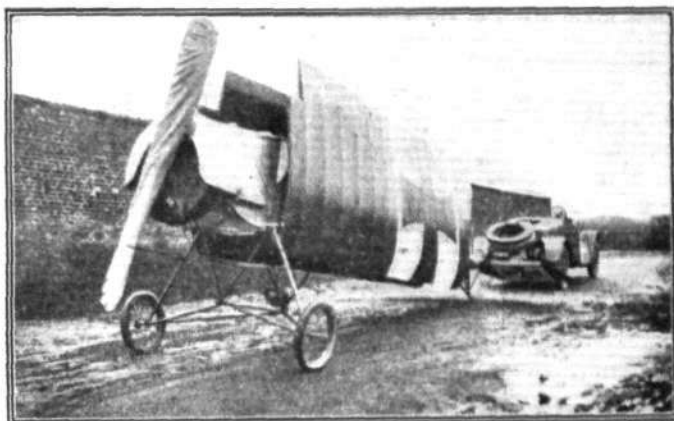
IN moving a vote of thanks to Mr. F. W. Lanchester for presiding at the Wilbur Wright memorial lecture of the Aeronautical Society last week, Lieut. Col. W. S. Brancker, R.A., Assistant Director of Military Aeronautics, gave some interesting details as to the work of the R.F.C. in the present war, which he said had fulfilled some of Wilbur Wright's wildest dreams. We put in the field a great number of different types of aeroplanes, and it was soon proved that British design and construction were far superior to those of our Allies and our enemies, and, backed up by the magnificent courage of our pilots, we soon established virtual command of the air. Every German pilot who put in an appearance was attacked at once and driven off, and it became almost the invariable rule that no German would face a British aeroplane.

Lately, however, the German machines had greatly improved in speed and climbing power, probably due to the fitting of improved engines. At the present time the enemy were using machines which were faster than many of ours, with the result that their pilots had become bolder. Although the German pilots had, to a large extent, discontinued attempting to reconnoitre above our lines, they now attacked British machines which were observing artillery fire or reconnoitring. In order to combat this, the R.F.C. now sent up machines in pairs, one to reconnoitre and the other to fight.

into a bank of cloud, and as his compass was not very reliable, he put the nose of the machine up in an attempt to get above the clouds, and get a glimpse of the sun. While shut off from the sight of land or sea, he thinks he must have overclimbed the machine, which felt for a short while as if it were going backwards. Suddenly it plunged forward again (probably after having stalled), and the sudden rush of air swept his cap and goggles overboard.

x x x

After flying in the clouds for nearly an hour, he cautiously came down lower, to try to get his bearings.



Transporting a German aeroplane (Fokker) by road.

Suddenly fields and trees appeared, hardly distinguishable through the fog. Turning more to the west, the coast was reached, and flying over the sands he came to a town near the mouth of a river. Realising that he had gone too far south, he turned and again followed the coast until he came within sight of Hardelet, where Garros' monoplane was already at rest. Filling up with petrol and oil, both aviators resumed their journey, and arrived in Paris without mishap. Here several aeroplane factories were visited, and Hirth invited Garros to come with him to Germany, to see some of the German aeroplanes. As Garros had never been to Germany, he accepted the invitation, and motored in company with M. Saulnier and Hirth to various aircraft works. Arriving in Berlin four days before the outbreak of war, Garros only stayed till Friday afternoon, when he returned to France. On the Sunday war was declared.

"ÆOLUS."

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The reason of the approach of the German aeroplane towards equality was due to the fact that at the outbreak of the war the aeronautical engine trade in England was comparatively undeveloped. But already higher-powered British engines had made their appearance at the front, and our aeroplanes were again showing their superiority.

For fighting in the air it was necessary for the machine to have weight-lifting qualities in order to carry the requisite armament, firearms or bombs, as well as such accessories as field glasses, cameras, wireless equipment, &c. Naturally the pusher type of machine had been proved superior for the use of weapons. Armour was necessary as a protection against shell splinters.

The stable aeroplane had become a standard type, and its stability had proved of great value; it enabled a pilot, flying alone, to have his hands free for offensive or defensive tactics, using his glasses, taking photographs, &c. It was possible for the pilot even to kneel on the seat and look over the rail. A further point was that it was the only type on which a hastily-trained pilot could be trusted to fly, and at the present time it was necessary for pilots to be turned out rapidly.

Improvements were still being made to our machines, and no doubt as the war went on the demand for speed, climbing power and ease of handling would be entirely met.

THE SCREW PROPELLER.

By F. W. LANCHESTER, M.Inst.C.E.

(Continued from page 362).

THE final step is the calculation of efficiency from the expression $\frac{\tan \theta}{\tan (\theta + \gamma)}$, employing conjugate values of θ and γ for each particular value of K as read from the appropriate *iso-K* line given in Fig. 18. In the plotting, Fig. 19, θ values are given by abscissae, ordinates = efficiency.

In Fig. 20 the efficiency is replotted against radius in terms of pitch, as in Figs. 8 to 13; the corresponding θ values are given as an irregular scale.

The two brief mathematical steps in the process as leading to the result given finally in Fig. 20 are as follows:—

(1) K in terms of θ and η .

Referring to Fig. 21, we have

$$v_2 = \cos \left(\theta + \frac{\eta}{2} \right) v \quad (1)$$

$$v_1 = V \sin \theta \quad (2)$$

$$K = \frac{v_2}{v_1} = \frac{\cos \left(\theta + \frac{\eta}{2} \right)}{\sin \theta} \times \frac{v}{V} \quad (3)$$

and from the construction

$$\frac{v}{V} = \eta \text{ in circular measure (approximately).}$$

or
$$K = \eta \frac{\cos \left(\theta + \frac{\eta}{2} \right)}{\sin \theta} \quad (4)$$

(2) C/η relation.

But by previous investigation ("The Aerofoil, &c.," Appendix IV),

$$C = \frac{\pi n}{4} \frac{v}{V} \quad (5)$$

but

$$\frac{v}{V} = \eta$$

or

$$\eta = \frac{4C}{\pi n} \quad (6)$$

In the graphic work, Figs. 16 to 20, the value of n (the aspect ratio) has been taken as 6; this must be regarded as rendering the results as plotted more exactly applicable to the aeronautical propeller, since it is rare that in the marine propeller the figure $n = 3$ is exceeded. The values of K which form the basis of the plotting have been arbitrarily taken as 0.15, 0.2, 0.3, 0.5, and 1.0 in addition to the calculated value of highest efficiency 0.07.

21. It is of interest to note that in Fig. 20, as we follow the curve of highest efficiency from its highest point outward from the axis, the value of K progressively increases; the reason of this is that γ can never have less than its minimum value assigned to it,

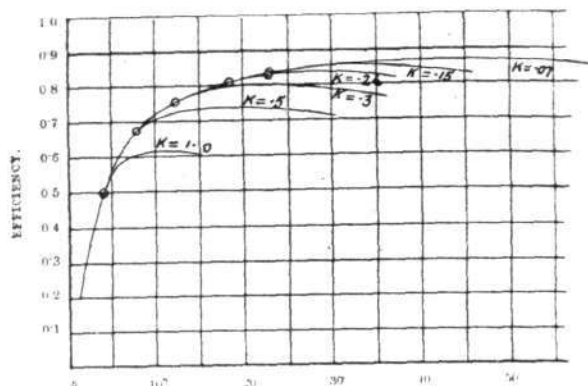


Fig. 19.

whereas θ diminishes the further we go from the axis. Thus we pick up in turn the curves of efficiency corresponding to the higher values of K , so that the curves denoting these values may be regarded as branches from the maximum curve, the points of junction being indicated clearly in the figure. It would, perhaps, be more accurate to consider the maximum curve to be the *envelope*

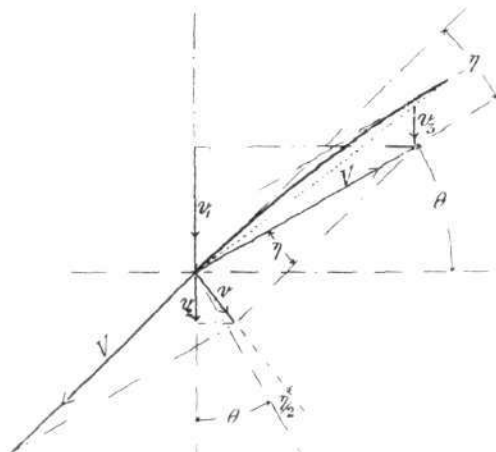


Fig. 21.

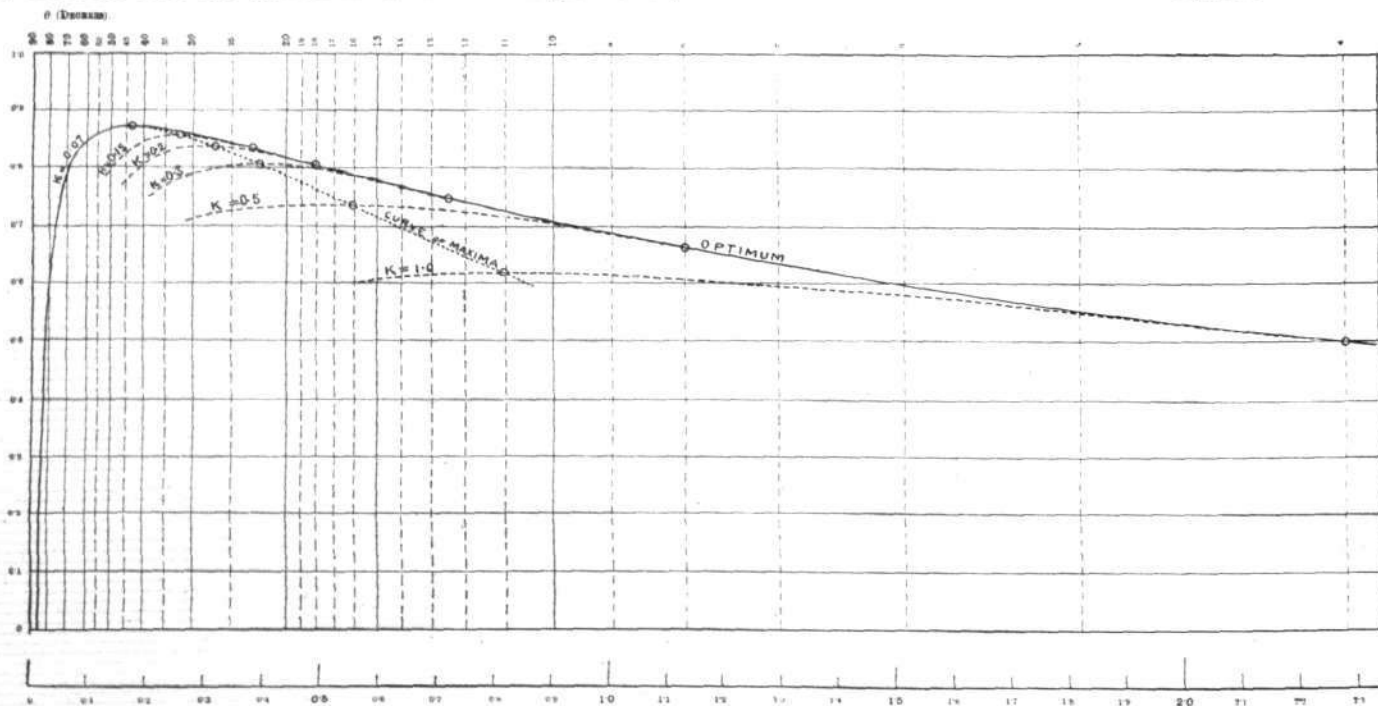


Fig. 20.

of the others, that is to say, to consider the curves of higher A value to be continued on the right hand of the points of contact, the efficiency again falling below the maximum; such continuations would represent portions of the blades carrying a lower pressure constant than that of least γ , a state of things which clearly is useless, unless, perhaps, under conditions in which cavitation is threatened.

It is probable that, in the other direction, were any attempt to be made to trace the curves close to the axis (Fig. 20), the method would sooner or later break down owing to certain of the approximations on which it depends ceasing to apply with sufficient exactitude; they could, however, without doubt be extended if required somewhat beyond their terminations as drawn.

The present treatment has been developed on its existing lines with a view to retaining as much elasticity as possible, and to this end mathematical work has been almost entirely eliminated in favour of graphic methods; thus, in place of the theoretical curve of resistance gradient (γ values), Fig. 17, any actual curve plotted from experiment may be utilised without modifying the procedure in the smallest degree. It has already been explained that this was not done in the example as presented owing to the fact that the basis of existing experimental values is so unsatisfactory: the theoretical curve is less likely to prove a source of error than any set of wind channel figures with which the author is acquainted.

22. Our next step is that of employing the information which is rendered available by plotting the curves given in Fig. 20 to the determination of the best pitch/diameter relationship. We have firstly to determine the diameter appropriate to the various degrees of restriction.

The problem of determining the correct propeller diameter cannot in practice be separated entirely from the question of the number of blades. Thus, it is evident that if a certain diameter be correct for a four-bladed propeller, and only two blades be employed, it will be necessary to make some increase in the diameter to compensate for the deficiency. The question involved is two-fold: firstly, provision must be made for the requisite mass of air per second to pass, that is to say, the disc area must be sufficiently calculated on the Newtonian basis; secondly, the propeller as an implement must be capable of dealing with the whole of the mass so provided; alternatively, the calculation must be rectified to take account of the deficiency of the propeller in this latter respect. The problem is complicated by the fact we are tied down to whole numbers so far as the actual quantity of blades is concerned, whereas the conditions may call for odd fractions; thus the designer is frequently under the necessity of choosing between a number in excess of the requirements of theory, so that there is interference and so unnecessary loss of power, or a number which falls short of theory, in which case he has to take a rather larger diameter to make up for the deficiency. Such a choice may be of value inasmuch as the restrictive conditions are not constant in every application, sometimes the diameter being a limiting factor in design, at other times the efficiency being the most important question; hence the solution which we seek must be one which will indicate to the designer clearly where his choice lay, and it must be our final object to present the result of the investigation in the clearest form possible.

Reference has already been made to the fact that certain conventions must be adopted in order to allow of the results being put in concrete form, such, for example, as the propeller diameter in relation to the blade radius of maximum efficiency, and the limits assumed as defining the active portion of the blade. No apologies are needed for the somewhat arbitrary proportions here adopted; the designer is at liberty to use any others he thinks fit and reasonable—the method will apply equally whatever the particular conventions chosen may be. The author takes twice the diameter as defined by the points of maximum efficiency as the diameter of the propeller disc in every case; on this basis taking the inner blade limit as being the point at which its efficiency is equal to its outer limit, we find, simply from trial on the curves plotted in Fig. 20, that the blade length may be fairly taken as $\frac{3}{4}$ of the disc radius. The reasons for taking the conjugate blade limits as approximate points of equal efficiency will be found in the author's "Aerodynamics," § 212.

The whole matter, put in brief, is summarised by the question: How much of the efficiency curve is it policy to utilise, and how much of the central region of the propeller disc are we prepared to sacrifice? For the purpose of the present paper the convention above defined is the author's reply.

23. The diagrammatic representation constituting Fig. 22 is an initial attempt made by the author to bring on to one sheet all the facts of importance relating to the design of a propeller; we may consider the examination of this diagram as a preliminary step before going on to a more elaborate effort in the same direction in which certain additional obstacles have been surmounted.

In Fig. 22 abscissae represent propeller radius and ordinates

effective pitch; the figure being made symmetrical about the origin, the axis of y is in fact the propeller axis, and different propellers are shown as projections of cylinders whose diameters and heights (appearing in the figure as rectangles) give the data of the propellers they represent. The outermost rectangle represents the case of maximum efficiency, that is, the case corresponding to $K = 0.07$ (compare Fig. 20), and shows the pitch/diameter relation to be slightly less than 1.5; this is, however, the effective pitch; the mean blade pitch will be in excess of this by an amount represented by the slip factor. In Fig. 22 an addendum is shown by a graph beneath the axis of x , which is presumed as added to the effective pitch; assuming this as correctly plotted (which it is not), the blade pitch in terms of diameter becomes more nearly 1.6. Now the propeller of maximum efficiency is the propeller which theory would indicate as right where no restrictions exist as to pitch or diameter, or as due to the weight of the propeller, or otherwise, and the diameter appropriate to any particular load and velocity for this particular case may be calculated from the usual form of expression,

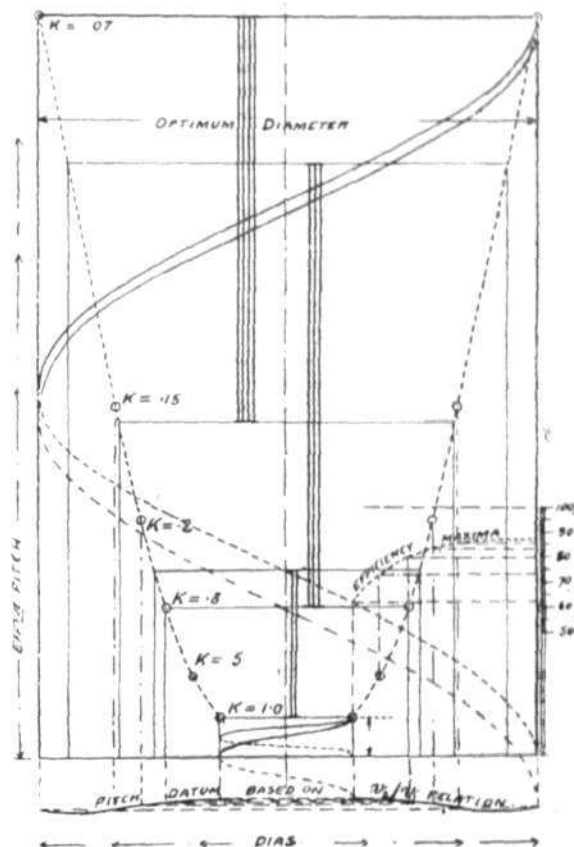


Fig. 22.

$\text{thrust} = \text{area} \times C_p V^2$, the value of the constant C being readily obtained, as will be exemplified later. The calculation of the diameter for the propeller of maximum efficiency gives a scale to the diagram, and for any given diametral restriction the appropriate effective pitch, i.e., the best pitch under the restricted conditions, may be read off. On looking at the figure, we see at once that the pitch/dia. ratio should be considerably less in the case of propeller diameters being adopted less than that described as the optimum; this is, the author believes, a fact well known to those experienced in propeller design, but not one that has previously been made the subject of rigid or quantitative treatment.

An attempt was made in Fig. 22 to deal with the question of blade number. The basis adopted was geometrical rather than dynamic, although the underlying facts are, of course, dynamic. Thus, taking the cylinder of diameter equal to the blade length ($\frac{3}{4}$ the propeller radius) as the equivalent of the periphery, the propeller race was considered as a rope made up of a number of cylindrical strands, each of which represented the periphery of one blade; the number of strands was calculated, firstly, on the assumption of no overlap or interference, and secondary on a certain degree of geometrical interference, which, from other considerations, was deemed permissible. The result of this is given in the bands of heavy vertical lines; four lines indicate that four blades are permissible, three mean three, &c., the overlapping of two bands means that either number is appropriate.

In Fig. 22 a curve of efficiency is given; this being a curve of maxima it is higher than anything which can be hoped for in reality; the values given by the graph represent the extreme maximum transferred from Fig. 20.

Fig. 22 was never looked upon as more than an initial trial, and it is clearly deficient in the matter of information as to blade number—the method is too crude to be allowed to pass. Beyond this, the basis of portions of the work has been revised, and a more accurate expression has been adopted for the diametral relationship; also the blade number has been dealt with on a purely dynamic basis.

24. As a mode of representing the screw propeller and the pitch-diameter relation in graphic form, Fig. 22 leaves little to be desired; it is true that the duplication of the curve on opposite sides of the axis is unnecessary, but the diagram so drawn does more closely represent the actual propeller, and is more easily read than a graph of less "pictorial" character. In Fig. 23, which represents the result of the complete investigation, the graphs on opposite sides of the axis are made to give different data; that on the left hand is the curve based on Newtonian theory without reference to the number of blades, whereas that on the right hand represents the full solution.

We shall now proceed to consider the plotting of Fig. 23 in detail, and in the first place we will go through the actual calculations point by point.

Pitch/diameter ratio. This is determined as a function of K as due to the variation in the angle of maximum efficiency, illustrated by the various curves and the graph drawn through the maxima in Fig. 20. If for any given value of K we wish to adopt the most advantageous proportion of pitch to diameter, we must so design that the blade includes the best portion of the efficiency curve for that particular K value and that portions of the curve showing low efficiency are discarded; it has already been stated that in this we shall take it as a convention that the propeller disc diameter is twice that of maximum efficiency. On this basis and referring to the figure we have,

| K . | θ (max. efficiency). | $\tan \theta$. | $\tan \theta$ 2 | $\times \pi = \frac{P}{D}$ |
|-------|--------------------------------|-----------------|--------------------|----------------------------|
| 0.07 | 43° | .932 | .466 | 1.46 |
| 0.15 | 33° | .649 | .325 | 1.02 |
| 0.2 | 27°—30' | .520 | .260 | .82 |
| 0.3 | 22°—20' | .410 | .205 | .65 |
| 0.5 | 16°—10' | .290 | .145 | .45 |
| 1.0 | 11°—10' | .197 | .099 | .31 |

The pitch/diameter ratio as above (last column) is, in Fig. 23, the tangent of the angle of lines passing from the origin through the corners of the rectangle representing the "cylinder" by which the propeller is defined (see scale to right and left of figure). We have next to determine the relative diameters as related to K in terms of the optimum propeller diameter = unity. This will be calculated on the Newtonian basis, the mass of fluid passing through the propeller disc being computed on the assumption that its velocity is the mean between the initial and final, i.e.,

$$u = v_1 + \frac{v_2}{2}$$

where u is the velocity in question. Now,*

$$\text{Thrust} = m_1 v_2 = \frac{15}{16} a \rho v_2 \left(v_1 + \frac{v_2}{2} \right) \quad (7)$$

but $\frac{v_2}{v_1} = K$

$$\text{or, } \text{Thrust} = \frac{15}{16} a \rho v_1^2 \left(K + \frac{K^2}{2} \right) \quad (8)$$

It is convenient to express the thrust in the form usual for pressure on surfaces and other cases following the V -sq. law, thus,

$$\text{Thrust} = C a \rho v_1^2 \quad (9)$$

$$\text{or, } C = \frac{15}{16} \left(K + \frac{K^2}{2} \right) \quad (10)$$

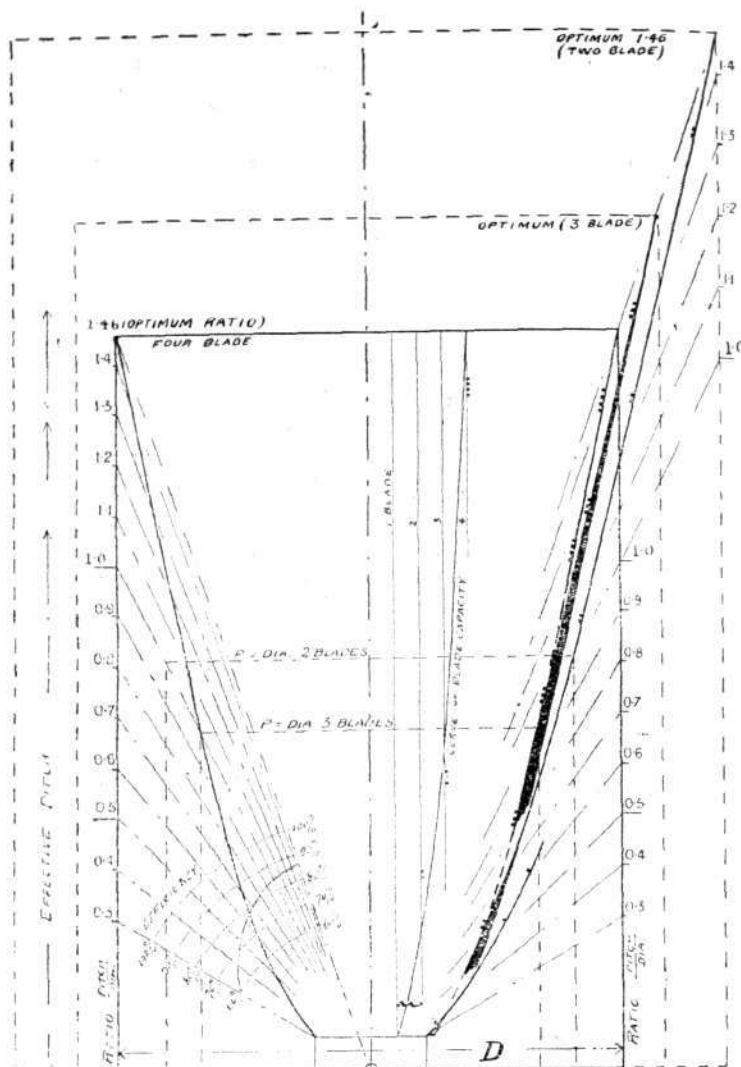
For the case of the propeller of optimum diameter, where $K = 0.07$, we have,

$$C = \frac{15}{16} \left(.07 + \frac{.0049}{2} \right) = .068 \quad (11)$$

* The factor $\frac{15}{16}$ is due to the deduction of the central "blind" area $\frac{1}{4}$ of the disc diameter.

Double Fatality in France.

ACCORDING to a telegram to the *Petit Parisien* from Hazebrouck, a British aeroplane took fire and fell to the ground at Old Berquin, near Hazebrouck. It is stated that both the pilot and the passenger, whose names were not given, died as the result of their injuries.



Basic data:— $u = v_1 + v_2/2$. Aspect ratio = 6. ξ (augmented value) = 0.017. Thrust constant on area given by dia. D ; (in abs. units) $C_0 = 0.068$. N.B.—Scale calculated from C_0 as above applies throughout both as to pitch and diameter.

$$\text{Thrust} = C \rho v_1^2 \pi D^2 \quad 4 \times 32.2 \text{ pounds.}$$

Fig. 23.

this value of C may be taken as the key value to Fig. 23, the disc area for any given thrust being calculated from equation (9), and the diameter so obtained gives the scale by which the diagram is to be read. Taking the above as unity the diameters appropriate to other values of K are obtained as follows:—

| K . | $K + \frac{K^2}{2}$ | C . | $\frac{.068}{C}$ | Rel. Diameter $= \sqrt{\frac{.068}{C}}$ |
|-------|---------------------|-------|------------------|--|
| 0.07 | .0725 | .068 | 1.00 | 1.00 |
| 0.15 | .161 | .151 | .45 | .67 |
| 0.2 | .220 | .206 | .33 | .575 |
| 0.3 | .345 | .323 | .21 | .466 |
| 0.5 | .625 | .585 | .116 | .34 |
| 1.0 | 1.500 | 1.406 | .048 | .22 |

The values obtained in the last column of the above table, in conjunction with the P/D ratios for corresponding K values of the table preceding, determine the plotting of the graph on the left hand of Fig. 23; the next problem is that of blade numbers.

(To be continued.)

Fatal Accident to Albert Moreau.

WHILE testing a new machine at Melun on the evening of the 20th inst., Albert Moreau, the inventor of the "Aerostable" monoplane, fell from a height of 1,500 ft. Moreau, who was recently awarded the Legion of Honour for his war services, died while being taken to hospital.

AIRCRAFT AND THE WAR.

WRITING under date of May 16th regarding the fighting on the Gallipoli Peninsula, Reuter's special correspondent at Cairo noted:—

"The greatest difficulty is experienced in locating the enemy's artillery. Directly a balloon or aeroplane goes up, the fire ceases."

In a description of the French front in the Argonne a Press Association correspondent, writing under date of May 17th, said:—

"We gained some idea of the labyrinth of trenches in this region from the photographs taken from aeroplanes at a height of 6,000 ft. by means of telephotography. There is a special department in the Army which, working with magnifying glasses, is able, with the aid of these photographs, to reproduce on a large scale maps of the whole system of trenches exactly to scale. The German trenches are marked in blue like a maze of delicate veins, while the French trenches are marked in red."

"We got a glimpse into the working of the French Flying Corps in visits which we paid to two aviation stations. In no department of military science have the French asserted their superiority over the enemy more completely. One had only to watch a Taube which hovered over Ste. Menneville early on the last morning of our stay. The German appeared indifferent of the efforts of the "75's" to reach him, and the white puffs of bursting shrapnel were generally short, but directly the French machine rose in the air to challenge him to a duel he made a hasty retreat to the German lines. This repugnance to accepting engagement with French aircraft is curious, when it is remembered that the Maurice Farman machine generally employed by the French has a speed only of 95 or 100 kiloms. an hour, as against 115 kiloms. possessed by the Taubes and Aviatiks. The superiority of the French aeroplane over the German consists in its arrangement, which enables the observer, using either carbine or mitrailleuse, to fire in any direction in front, behind, above, below, or on either side, whereas that of the enemy, owing to the tractor screw in front and the disposition of the planes, can only fire to the rear, and thus is only of use in a running fight. This may explain the evident disinclination of the Germans to accept a duel with the French aviator."

"One of the most useful functions performed by the air service is sending wireless messages from a height thousands of feet in the air. We were shown one of the machines which was just going to mount for observation purposes. To the right of the observer there was seen an ordinary telegraph transmitter, while passing through the floor of the car was a wire which could be lowered when in the air. By this means the observer is able to send messages to the wireless station to the rear of the trenches, which is in telephonic communication with all the batteries, and thus he can direct the artillery fire. We saw this machine rise, and become a speck in the air, and then we were taken to the wireless station in the woods. It was simply a little wooden hut, so small that we had to stand outside while the General talked to the operator. The latter explained the nature of his work."

Writing from Bale on May 20th, a *Daily Telegraph* correspondent said:—

"A Swiss firm at Zurich has been experimenting for some time past, with the benevolent assistance of the German Government, with a device for directing the aim of bombs from airships. It is alleged that this device, whatever it may be, is capable of effecting the release or discharge of bombs from airships with such precision that they may hit the aim with perfect sureness from whatever height and whatever pace they may be going, and also that the position of the airship or the vibration from motors or other causes does not affect its precision. The aim is directed by means of marine or field glasses. In connection with this there is another automatic discharge device, by means of which bombs or shells with explosives can be fired automatically, at the average rate of eighteen to twenty bombs or shells per minute. The shells or bombs, moreover, are made to drop on all occasions vertically, so that they are sure to explode, and this whether the airship is in motion or at rest. Even if such shells should drop in the water they can be arranged so as to explode when two metres beneath the surface, and thus damage the sides of a ship. An airship shed, which, perhaps, is already known, for the shelter of Zeppelins, exists, I am told, at Baden-Oos, near Baden-Baden. It is from this shed that many of the Zeppelins from time to time seen over the Black Forest set out on their flights."

Mr. H. Hamilton Fyfe, writing to the *Daily Mail* from Petrograd on the 20th inst., said:—

"The wedge thus driven by sheer weight of metal into the Austrian territory held by Russia consisted altogether of 180,000

men with no fewer than 1,000 guns. These were placed on several lines one behind another, the field artillery foremost and the heaviest guns farthest back. The fire was directed and checked by what is described as a host of aeroplanes. These were in the air morning and night observing and correcting the gunners' aim."

"One day the Russians brought down four of them, yet this did not appear to diminish either the number or daring of their enterprise."

A *Times* correspondent at Bucharest, writing on May 20th, said:—

"An Austrian airman yesterday threw three bombs on the slaughterhouses at the Rumanian town of Turnu-Severin, wounding several soldiers. The Austrian Minister has apologised, and expressed the willingness of his Government to pay for the damage. Turnu-Severin is near Orsova, on the Danube, and close to Serbian territory."

The *Daily Telegraph* correspondent at Athens, writing on the 20th inst., said:—

"Reports from Tenedos state that on Monday English aeroplanes dropped proclamations on the town of Gallipoli announcing an approaching bombardment, and inviting the population to leave the place. Yesterday aeroplanes and warships threw incendiary bombs and shells on the town, destroying portions of it and causing numerous casualties."

In a Reuter message from Athens on the 20th it was stated:—

"The Allied fleet, directed by aeroplanes, maintained a destructive fire against the Turkish positions throughout the entire day (18th inst.), and contributed largely to the success of the operations."

In the *communiqué* issued in Berlin on the 21st inst. it was stated:—

"North-east of Arras, near Fresnoy, we shot down an enemy aeroplane."

A *Times* correspondent in Paris, writing on May 23rd, said:—

"A German aeroplane, either an Aviatik or a captured French machine, succeeded yesterday evening in flying well over the centre of Paris without arousing suspicion. It was between 8,000 ft. and 9,000 ft. up. The pilot made for the neighbourhood of the Eiffel Tower and dropped eight bombs. The first fell in the Seine within a few hundred yards of the tower, the others fell no nearer. One pitched in a square which was crowded with children playing, but luckily did not explode. No one was hurt and very little damage was done."

"Several French aeroplanes immediately gave chase to the German, and he made off at a great speed."

A *Daily Telegraph* correspondent at Imbros, writing on Sunday night, said:—

"An enemy's aeroplane, flying at a great height, bombed our lines at Krithia. It was fired upon from land, and finally chased away by two of our seaplanes."

Writing on Monday, the *Morning Post* correspondent in Paris said:—

"Paris yesterday afternoon at about seven o'clock was thrilled with the spectacle of an aeroplane duel. A powerful monoplane, travelling at a very high speed, circled over Paris, and a biplane pluckily but ineffectually gave chase to it. All over Paris people gazed on at the duel, which had a brilliantly coloured sky as its setting, and wondered whether the Germans had not now some new and specially speedy type of aeroplane that far outclassed French models. This morning the fact emerges that the apparent duel was a French patrol, in which the monoplane was being escorted by the biplane, and the attempts apparently made by the two pilots to fire at each other in the air were only peaceful evolutions undertaken to enable the two machines to keep close together in the air."

In the Austrian official news on Monday there was the following:—

"Our seaplanes threw bombs on the balloon shed of Thiarvalla, the military buildings at Ancona, and the arsenal at Venice, causing visible damage and fires."

In a message to the *Daily Mail* from Rome on Monday, Mr. J. M. N. Jeffries said:—

"Eleven bombs were thrown on the Venice arsenal, but caused no serious damage. The damage to the railway was repaired in the course of the morning."

Writing on the following morning, he said:—

"The Austrian efforts yesterday to bomb the airshed at Jesi (near Ancona) lasted an hour. Two biplanes circled overhead; a plane of one was hit."

An Exchange message from Copenhagen, on Monday, stated:—

"It is reported that a fully-equipped flying corps, including Zeppelins of the latest type, has been brought to the Adige Valley."

In a long descriptive article in the *Daily Telegraph* of the 25th inst., Mr. A. Beaumont, writing from Bale, said:—

"Nearly every day, at almost stated hours, not long ago, the German inhabitants of the Rhine district have seen French and British aeroplanes over their towns; but never before had these birds of war come in such numbers as yesterday and the day before. Hardly had the guns and factory whistles announced their arrival at St. Ludwig and Huningen when others appeared at Neuenburg and Mullheim, and others, again, at Kandern, Wolbach, and Lörrach. They came as solitary flyers or in pairs, and sailed gracefully north, east, or south, in majestic curves, not minding in the least the noise of the barking batteries below or the bursting shrapnels in the air.

"In Bale, from whence most of these visitors could be seen and observed without the slightest risk, the inhabitants rushed to their windows to gaze; crowds gathered in the parks and squares, and travellers climbed to the roofs of hotels to have a better view. At seven o'clock in the morning we were awakened, and the first flight of biplanes could easily be seen over the village of St. Ludwig. They were soaring majestically, their broad white wings shining in the morning sun, at a height which we estimated at from 2,000 to 3,000 metres—that is to say, anywhere from 6,000 to 9,000 feet. So high were they that it was not easy always to detect their presence in the sky, even by means of powerful glasses. Our sight was guided by the trail of exploding shrapnels which burst beneath them, and the smoke of which floated like white cotton in the air. Others compared the puffs of white smoke to white handkerchiefs, flung up thousands of feet, and which unfolded and floated in the sky.

"On the terrace of the park of St. Margarethen, children stood and clapped their hands every time a shrapnel burst and dotted the sky. To them it seemed a pretty and diverting spectacle, and so it would have been had we not known that it was one of the realities of war. I can only compare the situation to something like what it is when one sees pictures on a cinematograph screen. The batteries fire, the shells burst, the men fall on the screen, and the spectator looks on unscathed and comfortable in his stall or arm-chair. On the other side of the Rhine, where those ominous white birds sailed at dizzy heights, with danger to themselves and danger to those below, we heard the batteries firing and the shells exploding. There people were running from the fields to take shelter in their houses, and men and women were hurriedly calling the children out of the streets. Soon afterwards when we heard bombs that had been dropped somewhere from the clouds explode in the midst of railway trains filled with soldiers, or other factories where arms and ammunition are being manufactured, we knew that it was not a cinematograph exhibition, nor a show, but a stern and desperate reality.

"Between us and the horrors of the war there lay only a conventional frontier line or the banks of the Rhine, whose waters, at this season of the year, are swollen and high, and are rushing with turbulent haste towards the sea. On this side of the river it was peace.

"On the other side of the frontier the visit of the birds of war spread terror and panic. The authorities and the Press express their indignation at the dropping of bombs and explosives. But, who is responsible for this bloody war? Who fired the first gun, and flung the first treacherous shell from the sky? Now, the terror and panic of war has also come to the inhabitants of Baden and Wurtemberg, and the Rhine Provinces, as they themselves and their compatriots had carried those terrors into Belgium and France in the West, and into other peaceful countries in the East, where they had not the slightest provocation. If, now, these dreaded birds of war come to visit them and fling explosives on their forts and defences, on their rifle factories and powder depôts, on their airship sheds and railway stations teeming with military and with preparations for war, they are receiving only what they have themselves meted out to others.

"This was brought home to them with more force than ever one recent morning. As the recruiting officer at Lörrach was counting out the latest contingents called over from the Swiss border, a bomb, dropped from somewhere overhead, fell and exploded close to his new recruits and future soldiers. It smashed through the roof of

the station workshop, whilst another burst on the line, tearing up and twisting the rails. His recruits escaped being struck only by chance, and dispensed with the trouble of girding on the cartridge belt and shouldering the rifle. We saw the two bold white messengers of death pass high over the town, and watched them as they disappeared, after a graceful swing northward, to visit other towns along the Rhine. Every gun and battery on the right and the left of the river let loose at them. There was heavy booming and barking, and the shrapnels burst with impotent rage beneath them as the winged visitors continued northward on their silent mission of terror and death.

"Up the Rhine, beyond Schaffhausen and the famous falls, lies the Lake of Constance, and on the German side of the lake is the celebrated port of Friedrichshafen, with its Zeppelin workshops, sheds, and piers, protected by a line of bristling batteries on land and a flotilla of armed motor-boats on the water. It was to this nest of a still worse kind of bird of war that the French and British war-hawks were steering. Flight after flight could be seen passing Rheinfelden. Up beyond the falls they dashed in pairs, six, eight, ten and more, until finally nobody knew how many had gone to challenge the Zeppelin birds of prey in their lair. Over the Lake of Constance the guns again boomed at them, and hurled shrapnel thousands of feet into the sky, and literally raked the lake with explosives.

"A captive balloon, with machine guns on a platform spitting out hundreds of bullets a minute, rose over the lake to defend the Zeppelin lair. Yet, one of the bold ten or fifteen flyers who had come more than 100 miles to deliver the challenge succeeded in flying clean over the piers and the workshops of Friedrichshafen, and six explosions, which followed as rapidly as a watch ticks, showed what he had left behind. On the piers, in the workshops, and under the sheds there was a panic among the 2,000 and more workmen who were busy building airships that were to be sent out at night to murder women and children in Paris or London. The columns of smoke which followed in the trail of the bombs gave the lie to the official German report that no harm was done."

In the *communiqué* sent out from Berlin on Tuesday there was the following:—

"At Cambrai a French airman dropped bombs immediately after church service, killing five French people and severely wounding twelve. Near St. Quentin we shot down an enemy aeroplane."

A *Times* correspondent in Paris, writing on May 25th, said:—

"Another attempt was made this morning by a Taube to reach Paris from the same direction as yesterday. It was driven off from the northern outskirts of the town before being able to drop bombs.

"Yesterday a Taube flew over Gérardmer, dropping four bombs. Another flew over the region south of Lassigny, but was chased off by French airmen. A third flew over Cassel on Sunday, and was violently fired at by anti-aircraft guns, but succeeded in escaping."

In the *Matin* of Tuesday last there was the following:—

"Two Taubes appeared yesterday over the suburbs north-east of Paris. They were travelling at a great pace, and seemed to be about to make for the capital, when aviators from the entrenched camp rose to give chase to them. The Taubes were flying a few hundred metres from one another. Thinking they were in the vicinity of one of our strategic formations, they each dropped six bombs, with which they were provided, then increasing their speed and rising to a greater height they made off to the north.

"The enemy's projectiles were incendiary and explosive bombs of the model of the one thrown recently into a Paris square. The first six exploded without causing any damage in the park of a private estate, the other six fell into a field, where they tore up some lumps of earth. Three of the latter were picked up intact in the afternoon by M. Kling, director of the Municipal Laboratory."

In an official telegram from Vienna received in Amsterdam on Tuesday, there was the following:—

"At Venice our naval airmen dropped fourteen bombs, causing a fire at the arsenal and heavily damaging a destroyer. They also threw bombs on the railway station, the oil tanks, and the balloon shed on the Lido.

"Our airmen dropped thirty bombs on the balloon shed at Charavalle, further inland. The airship Citta de Ferrara unsuccessfully dropped several bombs on the Zrinyi and attempted an attack on the fleet when it was leaving, but quickly disappeared when two of our airmen came up.

"The same, or another airship, was sighted by our fleet shortly after midnight half-way between Pola and Ancona, doubtless en route for Pola. But when the three accompanying vessels fled before our guns the airship turned and disappeared in a north-westerly direction, without, apparently, having seen our fleet."

In the *Petit Journal* of Tuesday it was stated that Prince Castagneto Caracciolo, Councillor and First Secretary of the Italian Embassy in Paris, after confirming reports of the Austrian aeroplane attacks on Porto Corsini, Ancona, and Barletta, said that these were not the first hostile acts committed by Austria during the last few days.

The same issue of the *Petit Journal* also contained the following:—

"There have been numerous attacks by land and in the air, Venice being the affected district on each occasion, but hitherto it had not been considered necessary to report them. Moreover, our

More Aeroplanes from Over-Seas.

THE scheme of the Over-Seas Club for the presentation of an aeroplane to the British Government from every section of the Empire is being strongly taken up, and in addition to the definite offers from Gibraltar and Nova Scotia, Saskatchewan is now collecting the necessary £1,500 for the purchase of a machine. The King has expressed his interest in the scheme in the following letter to the Honorary Secretary of the Club:—

"Buckingham Palace, May 19th, 1915.

"Dear Sir,—The King is interested to hear of the generous action of the members and friends of the Over-Seas Club in presenting to the Royal Flying Corps an aeroplane, and of their intention to make further similar contributions.

"Yours very faithfully,
"STAMFORDHAM."

Lord Kitchener has also written as follows:—

"War Office.

"Dear Sir,—I am gratified to hear of the prompt response to the appeal issued by the Over-Seas Club to its members and friends in all parts of His Majesty's Dominions Over-Seas which has already permitted the presentation of an aeroplane to the Royal Flying Corps.

"I was interested to learn that the aeroplane in question had been paid for by the generous donations of several thousands of British subjects over-seas, and, as I understand that you are hoping to obtain the gift of an aeroplane from each part of the Empire, I sincerely wish you success in your efforts.

"Yours very truly,
"KITCHENER."

Further particulars of the scheme can be obtained from the Over-Seas Club, General Buildings, Aldwych, W.C.

Precautions Against Zeppelin Bombs.

THE following official warning to the public has been published:—

"A notice was issued early in the year advising members of the public, in the event of an air raid, to take refuge in houses, so as to be out of the way of falling fragments of the shells that might be fired at enemy aircraft.

"The Commissioner of the Metropolitan Police is advised that it would be well for persons thus taking refuge to keep all windows and doors on the lower floors closed, so as to prevent the admission of deleterious gases."

Precautions Against Aircraft Raids on London.

MR. MCKENNA, the Home Secretary, was asked in the House of Commons last week what measures are being taken to deal with outbreaks of fire in the London area in the event of a Zeppelin raid. In reply he said that he was not prepared to state the measures devised for dealing with such a contingency, or to say more than that those measures are the outcome of most careful consideration by all the authorities concerned. It is not, he was informed, possible to utilise the various volunteer corps in this connection.

City Police Take Precautions.

IT is understood that the City Police are taking precautions to protect their officers and men from the effects of poisonous bombs should London receive the unwelcome attentions of enemy aircraft. Each station in the district has been supplied with a large stock of respirators to be served out in case of need.

To Aid the Fire Brigade.

WITH a view to rendering assistance in the event of an air raid on the Metropolis, arrangements have now been made for a guard composed of men connected with the Central Association of Volunteer Training Corps to be posted during the war at the headquarters of the London Fire Brigade, Southwark Bridge Road, S.E.

aviators had received orders not to undertake any action which might lead to a frontier incident of any sort, and not to make flights over Italian territories which are still under Austrian sway. This is now no longer the case, and Italy has complete confidence in the valour of her sons in the defence of the Fatherland, not only by land but also in the air. Venice remains calm and confident of victory. The first flights of the enemy's aircraft are not calculated to take us by surprise. We are ready to reply to them—if this has not already been done.

"A number of Italian aviation officers arrived in Paris yesterday to take delivery of machines constructed in France for Italy. After having attended trials of the machines yesterday morning, which it is believed will be continued to-day, these officers will set out without delay for the Friuli Alps and the frontiers of Carinthia and Istria."

German Seaplane Sunk.

A BRITISH destroyer on Tuesday landed at Harwich a German sub-lieutenant and his mechanic who had been taken off a German seaplane in the North Sea. The machine, having had to come down through engine trouble, had been drifting for about nine hours. It is stated that the machine, which had a quantity of bombs on board, was sunk. Pending to being removed to a place of internment, the prisoners were placed on H.M.S. "Ganges."

German Airship Breaks Away.

ACCORDING to a message from Koenigsberg, printed in the German newspapers last week, an airship broke loose on May 21st, and was last seen drifting in a westerly direction. No crew was on board. The authorities asked that information in regard to its movements or its alighting should be sent immediately to Koenigsberg. One report states that the airship had been seen over Buetow.

Another "Kultur" Victim at Ramsgate.

A SECOND victim of the airship raid on Ramsgate was Mrs. Florence Lamont, who died on the 20th inst. from injuries received in the wrecking of the Bull and George Hotel, at which she was staying. At the subsequent inquest the jury returned a verdict that "Death was due to injuries caused by a dastardly and illegitimate act of war."

The S.M.M.T. Aero Committee.

AT the last meeting of the Management Committee of the Society of Motor Manufacturers and Traders, the matter of the Aero Committee being represented both on that Committee and the Council was under consideration. As a temporary expedient, Mr. T. C. Pullinger, of the Arrol-Johnston Co., agreed to act on the Aero Committee, but the matter is to be considered again before the next elections.

Aeroplane Factory Staffed by Amateurs.

A SOMEWHAT novel method of obtaining an aeroplane factory staff has been initiated by the *Daily Express*, which, in its issue of the 21st, called for two hundred amateur mechanics and carpenters. It is stated that these are required for an aeroplane factory which is to be established in the South of England. The immediate need is for turners, fitters, machine-men, and carpenters, and it is stated that adequate remuneration will be paid.

A New-Comer to the Industry.

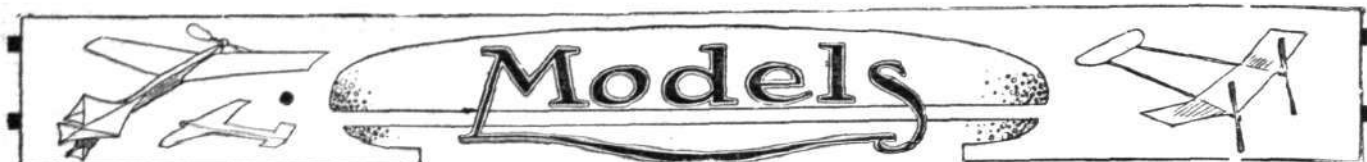
IT is gratifying at all times to welcome a new-comer to the aeronautical industry, and especially so at the present time when the needs of the Flying Services are taxing the energies of the makers to the utmost. One of the latest firms to come in is the Whitehead Aviation Co., who have taken the works formerly occupied by the Howard Flanders Co., at Townshend Terrace, Richmond. We understand that they are making arrangements to undertake the building of aeroplanes on a large scale.

Aeroplane Building Plant for Sale.

FROM an announcement in our advertisement columns it will be seen that a favourable opportunity is afforded to aeroplane builders to secure some useful plant in the way of woodworking machinery, machine tools, electric motors, material, &c., from the works formerly occupied by the Hamble River, Luke and Co., Ltd. The works are also to be disposed of at the auction which is to be held on the premises, commencing on Tuesday next, at 12 noon.

Photography in Five Lessons.

SUCH is the title of the latest booklet issued by Messrs. Burroughs, Wellcome and Co. It is unique in many respects. Not only is it absolutely devoid of padding but the illustrations are as usual of high quality, and are not mere decorations. They really illustrate and explain points such as sepia toning, green toning, and the effects of errors in exposure, both as regards plates and papers. A copy will be sent gratis and post free to any reader applying to Messrs. Burroughs, Wellcome and Co., Snow Hill Buildings, London, E.C., and mentioning FLIGHT.



Edited by V. E. JOHNSON, M.A.

Double Surface Planes.

WRITING from Leicester, Mr. H. Sibley says:—"In the article, 'Some Hints on the Building of Model Aeroplanes,' I notice that you state: 'Owing to the extra weight and difficulties of construction on a small scale it is not advisable to use "double surface" aerofoils on small models—say under 5 or 6 ft. span.'"

"I do not quite agree with this, being a strong believer and user of double surface wings. Where does 'the extra weight and difficulties of construction' come in? Is it that the subject of double surface wings has not been sufficiently tackled to produce the right result? It is some years now since I constructed my first double

but for hard solid service. Apart from the above I have built by this method double surface wings of all shapes and sizes up to 5 ft. span.

"The chief factor as regards weight in double surface wings is the amount of proofing used; the above wings are well proofed and have glazed surfaces. The weight of the dope in some cases amounts to as much as $\frac{3}{8}$ oz. of total weight."

Use of Model Aeroplane Clubs.

The following letter from Mr. W. E. Evans of the Paddington and Districts Aero Club will doubtless be of interest to a good many readers of these notes:—

"A member of our club has received a letter from one of the earliest members of the club who recently joined the Royal Flying Corps. The gist of the communication is as follows:—"I had almost forgotten the old club until someone mentioned the good work and foremost position held by the Paddington and Districts Aero Club; and others, especially from the Midlands, have spoken of the club with the highest praise. To me it was well worth taking up models as I find my experience is of great help and have got everyone in our room on any point and am looked upon as a bit of an expert. I am expecting my first flight very shortly. Congratulations to Mr. W. E. Evans for his untiring efforts, which have done so much for the club. Best wishes for its future success."

"It is very gratifying to the club to receive the above letter, and to know that the work has not been in vain. Another member has joined the R.N.A.S., namely, Air-Mechanic D. Driver. The research and compressed air models are progressing satisfactorily."

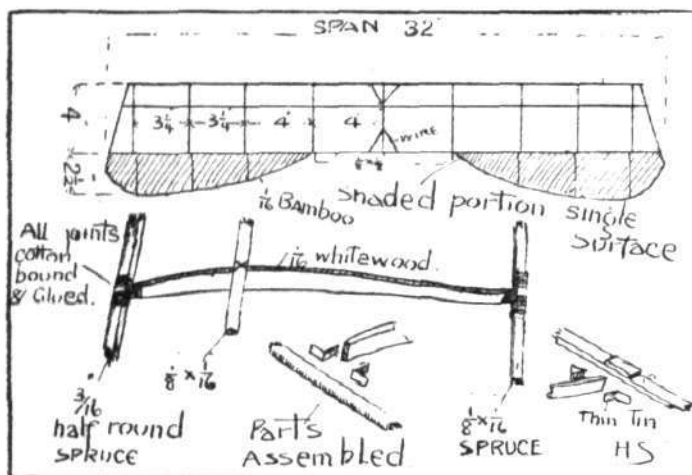
A Model Blériot.

Mr. David Hay, writes as follows from Denny, Stirlingshire:—

"Herewith you will find two photos. of a model Blériot, two seater, which I built for a shop window last Christmas. The model was built from photos. which have appeared in FLIGHT. I am sorry I cannot send any photos. of my flyers, but hope to do so later on. I have built two models lately from parts supplied to me by W. G. Smith, London, and I must say that they are great flyers; one has flown close on half-a-mile, of course there was a smart wind blowing; the other—an r.o.g. one—I can get a distance of 300 yds. out of. I have built models from the year 1910, and have had many a failure, but with the help of FLIGHT, and drawings and details of the models that have appeared in it, I have met with success, and must say that FLIGHT is the best paper to read on such a subject. I am the first model flyer in Denny, and I am trying to get a model club formed here. My Blériot two-seater is 4 ft. 9 ins. long by 5 ft. span, and has all parts workable. I will be pleased to give any readers of FLIGHT scale drawings or any part concerning same. I am busy just now on a tractor monoplane which is nearly finished."

Model Work in the States.

It is perhaps hardly surprising that now that increased attention is being given to aviation in the United States there has been a revival in model work. According to *Aerial Age*, there are now over a dozen clubs, in various parts of the country, which are holding meetings and organising competitions, &c.



surface wing, and the method of construction I then used has stood the test of time, and I still continue to use it.

"At the aviation meeting at Burton-on-Trent, in August, 1913, I flew a model fitted with a double surface wing (a very heavy one, $1\frac{3}{8}$ ozs.) in open competition, and obtained seventh place with a duration of 52 secs., so do not think the method can be condemned on the score of duration.

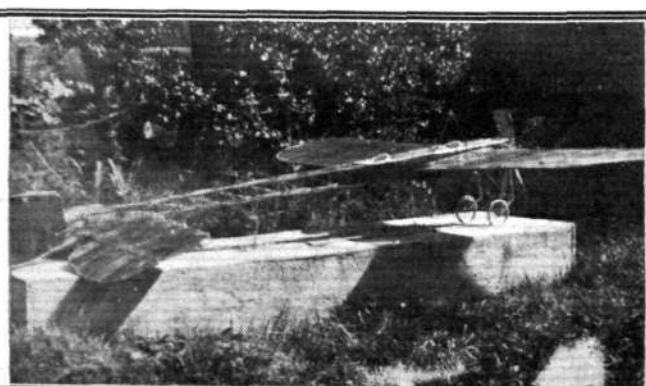
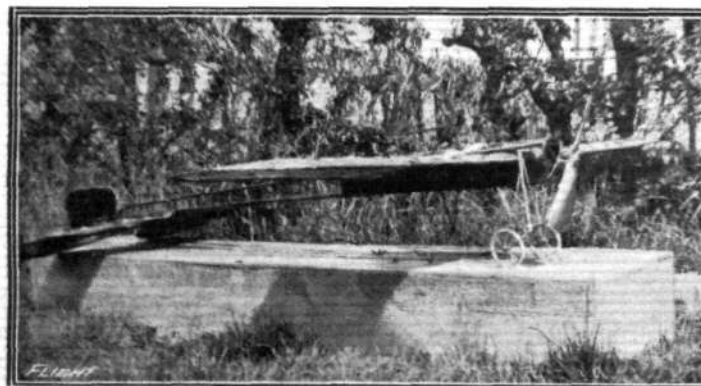
"Below I give details of various wings that I have by me which might interest your readers:—

"(1.) (See Figure.) Double surface wing, fitted to a 7 oz. P-2-1 type; span, 32 ins.; chord, 4 ins.; underside camber, $\frac{1}{8}$ in.; top camber, $\frac{3}{8}$ in.; wing cabane and tie wires by which wing may be suitably adjusted as to dihedral, &c. Total weight, $1\frac{7}{8}$ ozs.

"(2) Double surface wing. Span, 35 ins.; chord, $4\frac{1}{2}$ ins.; underside camber, $\frac{1}{8}$ in.; top camber, $\frac{3}{8}$ in.; wing cabane. Total weight, $1\frac{1}{8}$ ozs.

"(3) Double surface wing. Span, 24 ins.; chord, 5 ins.; underside camber, $\frac{1}{8}$ in.; top camber, $\frac{3}{8}$ in.; no wing cabane. Total weight, $\frac{1}{2}$ oz.

"The above wings were not specially built for duration machines,



Mr. David Hay's model Blériot.

"FLIGHT" PRIZES OF MERIT.

WE print below an interesting communication to which a FLIGHT Certificate of Merit has been awarded, and take the opportunity of reminding our readers of the main lines of the scheme, in which there are absolutely no rules, and no competition in the strict sense of the word. Whenever the Editor considers that a reader has sent in an especially interesting and carefully prepared communication, which may be either in the form of a letter or an article, he will recommend the award of a prize, and the correspondent will receive a little certificate of merit accompanied by a cheque for 5s. It should not be difficult for any student of model aeronautics to win one of these prizes, but it will not be so easy that anyone can pick them up by merely writing a hasty note. They are prizes of merit,

and we have no intention of awarding them unless the communication is meritoriously above the average. To be meritorious it is not necessary that the communication should be either lengthy or complicated, but it is necessary that it should show real serious thought, an understanding of the subject written about, and be a good attempt to lucidly express the information in a way that can readily be understood by others.

Some subjects are adequately dealt with by a letter, others are better suited to a short article, while, with others again, the merit of the information may lie in the neatness and accuracy of a set of sketches, drawings, or photographs that illustrate how one may make something that is worth while making.

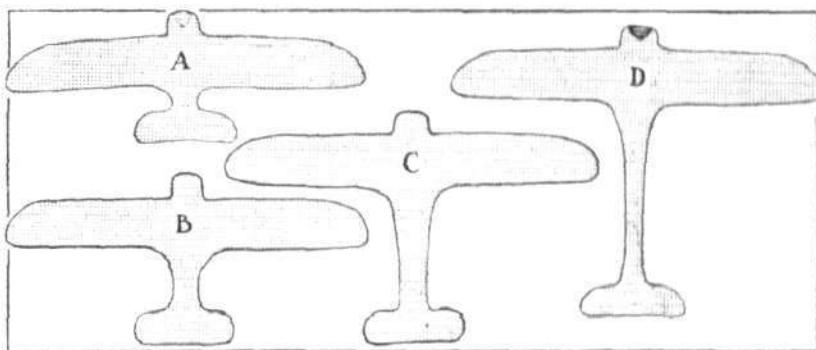
THE BEST LENGTH FOR A FUSELAGE.

By JOHN F. LEEMING.

ALTHOUGH the following experiments cannot pretend in any way to be conclusive, the subject to which they are intended to relate presents an interesting problem. To our correspondent belongs the credit of appreciating the importance of this problem, and of having endeavoured to obtain some experimental data on the subject with the apparatus at his disposal. Although, as we have said, the research itself is inadequate, we commend the simple character of the initial test, and for this and the above-mentioned reason have awarded the FLIGHT Certificate of Merit.—ED.

The following experiments were made to discover whether the gliding angle and stability of a model were improved when the tail was placed near to, or at some distance from, the centre of gravity on the aeroplane: in short, to find which position was best. On a full-sized aeroplane a more sensitive control is obtained by having the tail well away; but, on a model where there is no pilot to manoeuvre the machine, this would seem to be an undesirable factor. The aeroplane with a good high gliding angle will obviously take less power to fly than one with a low angle; therefore, it is of considerable importance for the model designer to know whether by putting the tail far away he is improving the machine or not. The instruments used to investigate this problem were four paper gliders, made from waterproof cartridge paper, and weighted with Harbutt's plasticine, which is by far the best material for the purpose. Every glider had exactly the same shape of planes, loading area, and aspect ratio, the only difference being the length of fuselage. For the purpose of reference they were lettered, and each model was given eight trials (under the same conditions as the others) before the results were arrived at. For the wind test they were launched in an artificial draught caused by a large fan, and the results carefully checked by several flights out of doors. The span of each glider was 6 inches, the chord 1 inch, the weight .04 oz. (approx.). For flying in rough weather A did best, being not so sensitive to the gusts which strike the tail as C and D. The machine with the best angle was also A, it was in fact by far the best. Two rubber-driven tractorplanes, constructed in the same manner, but with a long fuselage and a short one, fully bear these trials out—the one with the short fuselage flying with two less strands of rubber than its rival.

Both the tractorplanes were accurately weighed before and after the flights, while as every part on the one was the exact replica of the corresponding part on the other, the question of resistance was practically avoided. Each model weighed 3 ozs., had a span of 24 inches, a chord of 3 inches, and was driven by one 8-inch Chauviere tractor. No. 1 was 38 inches long, and No. 2 30 inches long. No. 2 would rise and fly 80 to 90 yds. moderately steady,



while No. 1 showed a strong tendency to land after the first 10 yds. or so, as if it had not enough power; when to stop this the tail was altered, great trouble was met with owing to the machine slipping backwards, no happy medium being obtainable. When two strands of rubber were added, No. 1 certainly flew better than before, but it never equalled No. 2, which, having a less number of strands, remained in the air longer.

Therefore, as in the gliders, a short fuselage is best.

| Glider A. | Glider B. | Glider C. | Glider D. |
|--|---|---|--|
| Length of fuselage 1 in. Very good glider; angle about 1 in 9; flew quite straight, very quickly. | Length of fuselage 2 ins. Not such a good glider as A; slightly slower. | Length of fuselage 3 ins. Has a strong inclination to "switch-back"; quite slow. | Length of fuselage 4 ins. To get the best results with this model, more weight had to be added; flew quite well, but so sensitive to the tail that very few straight flights were obtainable. |
| Wind Test. | Wind Test. | Wind Test. | Wind Test. |
| Rocked laterally badly; a very easy model to launch. | Very unstable; rocks so badly that sometimes the model turns completely over. | Moderately stable; has a strong tendency to oscillate longitudinally. | Difficult to launch; also it had a similar tendency to Glider C. |

The Lanchester Trophy for Model Gliders.

IT is announced in the annual report of the Aeronautical Society that it is hoped to publish before long full details regarding the important competition, having for its object the improvement of aerofoil efficiency, which is being organised. The chief award will be a trophy presented by Mr. F. W. Lanchester.

Tests of Models in Wind Channel.

IN the same report it is noted that the model competition to be undertaken, in co-operation with the Kite and Model Aeroplane Association, under the control of the Society's Research Committee, has been postponed for a time, but will be taken up again at an early opportunity.

